

Green Zia Environmental Excellence Program Achievement-level Application: Los Alamos National Laboratory DYNAMIC EXPERIMENTATION DIVISION



A test shot at the PHERMEX facility. A large-format digital camera, capable of recording time-sequenced radiographic images during an explosive event, has replaced a conventional camera. Replacement has eliminated a 450-gallon-per-year photochemical waste stream, at an annual cost savings of \$100,000.

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Green Zia Environmental Excellence Program

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Green Zia Environmental Excellence Program

Achievement-level Application:

Los Alamos National Laboratory

DYNAMIC EXPERIMENTATION DIVISION

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Green Zia Environmental Excellence Program

Achievement-level Application:

Los Alamos National Laboratory

DYNAMIC EXPERIMENTATION DIVISION

0 ORGANIZATIONAL OVERVIEW

0.1 BASIC ORGANIZATIONAL DESCRIPTION

Los Alamos National Laboratory (LANL) is owned by the US Department of Energy (DOE) and operated under contract by the University of California (UC). Established in 1943 as part of the Manhattan Project, LANL's original mission was to design, develop, and test nuclear weapons. As technologies, US priorities, and the world community have changed, LANL's mission has broadened to enhancing global security by ensuring safety and confidence in the US nuclear weapons stockpile, developing technical solutions to reduce the threat of weapons of mass destruction, and improving the environmental and nuclear materials legacy of the Cold War. In addition, LANL applies its scientific and engineering capabilities to assist the nation in addressing energy, environment, infrastructure, and biological security problems.

LANL is composed of nearly 30 major organizations, called divisions. Each division has a leader, group leaders, and team leaders. The divisions partner with each other to provide environmental support. The Dynamic Experimentation Division (DX) is organized into eight groups (see Figure 0-1). Each group is subdivided into teams based on the products and services they provide.

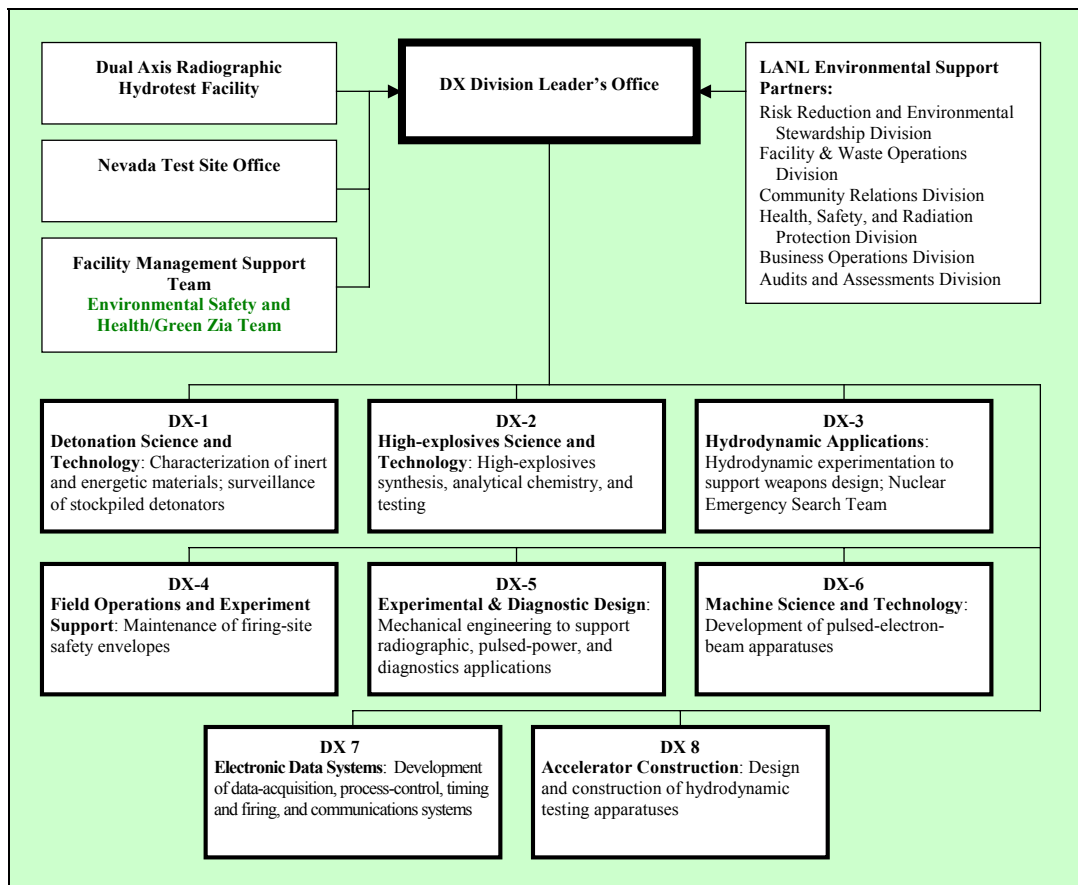


Figure 0-1. DX Division organizational chart and environmental support partners.

DX Division's principal activities are research, development, and testing in support of LANL nuclear weapons and US Department of Defense programs. DX is also involved in environmental monitoring and remediation research, industrial collaborations, and technology transfer.

Environmental management is a core value at DX Division and is subject to our continuous quality improvement (CQI) program. That is, feedback on our pollution prevention (P2) and energy efficiency (E2) effort

- is incorporated into our key business processes
- is self-reinforcing
- generates action plans

See Figure 0-2 for a high-level process map of the DX Division environmental management system. Our environmental management system is the Laboratory-wide Integrated Safety Management (ISM) system, which is discussed in Items 1.1, 2.3, and 6.2.

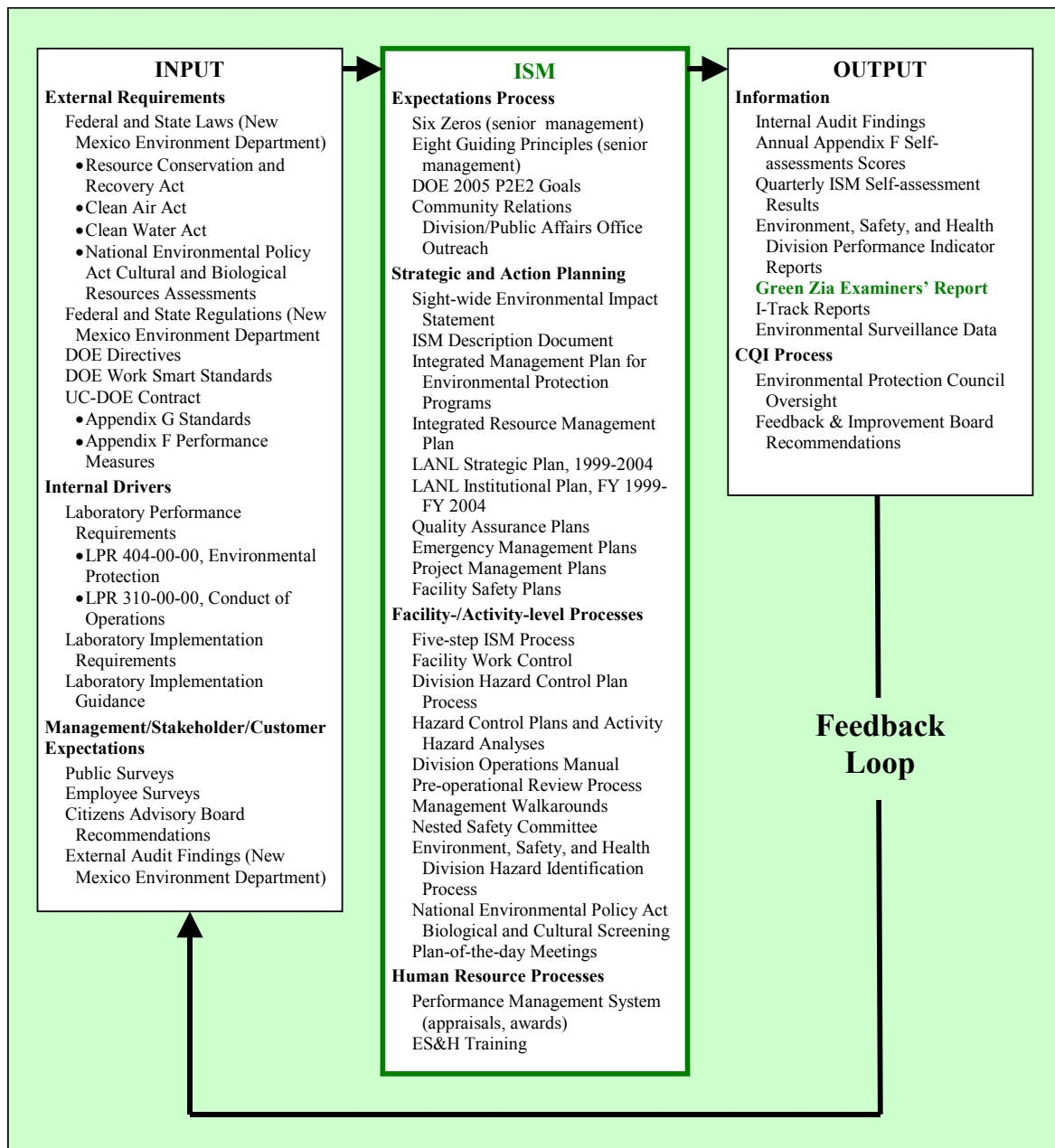


Figure 0-2. The DX Division environmental management system.

An inter-organization body at LANL, called the E in ISM Team, is specifically charged with promoting environmental values in the ISM system. DX Division's Facility Management and Environmental, Safety, and Health (ES&H) Teams actively participate.

Federal regulatory agencies with environmental oversight for various LANL operations include the Environmental Protection Agency (EPA), DOE, the Occupational Safety and Health Administration (OSHA), and the Nuclear Regulatory Commission (NRC). The New Mexico Environment Department (NMED) also oversees and regulates LANL activities. Many waste-management operations at LANL and DX are governed by provisions of the Resource Conservation and Recovery Act (RCRA). Further, the National Environmental Policy Act (NEPA) has mandated the development of the LANL Site-wide Environmental Impact Statement (SWEIS).

Additionally, DX operates the Dual Axis Radiographic Hydrodynamics Test Facility (DARHT). DOE published a Record of Decision (ROD) on the Final Environmental Impact Statement (EIS) for DARHT in the Federal Register in October 1995 (60 FR 53588), pursuant to the regulations of the Council of Environmental Quality (40 CFR 1500-1508). The ROD further states that DOE developed several mitigation measures to protect soils, water, biotic, and cultural resources. Also, DOE has agreed to an ongoing consultation process with affected Native American tribes to ensure protection of resources of cultural, historic, or religious importance. The Laboratory liaises directly with the Eight Northern Indian Pueblos Council and has entered into a formal Accord (1992) with four pueblos (Cochiti, Pojoaque, San Ildefonso, and Santa Clara) whose members recognize sacred sites on DOE land. Following completion of the EIS and associated ROD, DOE prepared a Mitigation Action Plan (MAP) that addresses mitigation commitments expressed in the ROD. The MAP explains how the corresponding mitigation measures, designed to mitigate adverse environmental impacts associated with the course of action directed by the ROD, will be planned, scheduled, tracked, and implemented.

LANL operations—including those of DX Division—are shaped and evaluated by operating contract requirements negotiated by DOE, UC, and LANL. By agreement of the signatories, legal and regulatory standards are made a part of the contract by reference in Appendix G, as are work-related standards culled from, e.g., the Code of Federal Regulations, the American National Standards Institute, and the Uniform Building Code. Performance measures incorporated into the UC-DOE operating contract are contained in Appendix F and provide a broad range of specific goals, measures, and evaluation criteria. Appendix G standards and F performance measures are revised annually.

Appendix F serves as a key method of determining both customer expectations and organizational performance. The contractual provisions that constitute critical measures of LANL and DX performance in the environmental arena are set forth in Item 2.3. Contractual provisions 1-3.1.a and 2-1.2.c.1 explicitly call out as a scoring criterion the application of Green Zia tools to identify P2E2 opportunities (see Items 2.2 and 4.2). Provision 3 enhances ISM environmental components by making managers accountable for implementing environmental management systems, leadership programs, and pollution-prevention considerations and audits, to meet the requirements of Executive Order 13148, Greening of the Government through Leadership in Environmental Management, April 22, 2000. Items 0.4, 2.3, 3.1, and 6.2 and Categories 4 and 7 provide details on the Appendix F process.

Regulatory agencies provide feedback on the Laboratory's, and DX Division's, compliance with environmental requirements through external audits, a process that is often partnered with the LANL Risk Reduction and Environmental Stewardship (RRES) Division and the Audits and Assessments Division (AA).

But mere compliance is not LANL's goal, nor is it DOE's. Appendix F performance measures in the UC-DOE operating contract drive us beyond compliance, to P2E2 excellence. Feedback on Appendix F performance measures is provided by DX Quarterly Appendix F Self-assessments, which, along with quarterly self-assessments from across the Laboratory, funnel into LANL Annual Appendix F Self-assessments, a process mediated by the high-level-management Feedback & Improvement Board (F&IB). Ultimately, UC and DOE conduct evaluations of LANL's Appendix F performance to determine whether provisions of the management contract are being met.

LANL has a clearly articulated mission: Reduce the global nuclear danger.

DX Division likewise has a clearly articulated mission, which supports that of LANL: Enhance national security through experimental knowledge to underpin and validate weapons science.

DX enables LANL to achieve its mandate by providing products and services through key R&D business processes centering on energetic materials, dynamic response of materials, integrated systems testing, and detonator production. Our primary responsibility is managing key elements of the nation's nuclear weapons program, including munitions technology, subcritical experiments, and hydrodynamics experiments. "Energetic materials" in this context means high explosives (HE). "Dynamic response" means the behavior of materials when subjected to the enormous pressures that prevail in an HE detonation. The term "hydrodynamics" denotes phenomena associated with the behavior of fluids; certain metallic components of nuclear weapons respond to the pressures of an HE detonation by behaving as fluids. None of our R&D work involves achieving nuclear criticality but is, rather, confined to "subcritical" conditions.

DX core capabilities involve state-of-the-art expertise in

- investigations to gage the stability of aging nuclear weapons
- detonator design and production
- detonation and shock physics, including conventional warhead design, HE pulsed-power systems, and characterization of materials in high magnetic fields
- sensor design, signal analysis, and image processing, especially in electronic, radiographic, and photographic applications
- communications and computing
- fabrication, firing-system engineering, and blast containment
- ES&H practices

The last bullet in the above list is vitally important in our line of work. We rigorously manage and mitigate hazards for and with our employees and the general public. Further, as will be made clear in this application, we rigorously manage hazards to the environment as well. Dynamic experimentation can physically disturb natural systems, and many of the substances we work with are hazardous. Minimizing disturbance, preventing pollution, conserving energy, and remediating impacts when they occur are among our key business processes.

Our principal facilities are arrayed across 22 square miles of real estate at LANL Technical Areas (TAs) 8, 9, 14, 15, 22, 36, 39, 40, and 69. These facilities house activities that include

- high-explosives science
- explosively-driven pulsed-power and high-energy-density physics
- DARHT—Dual Axis Radiographic Hydrodynamic Test Facility (under construction)
- Department of Defense programs—advanced conventional munitions development
- PHERMEX—Pulsed High-Energy Radiographic Machine Emitting X-rays
- eleven multipurpose firing sites
- detonator production

Operating costs for LANL totaled \$1.409 billion in FY01. FY01 operating costs for DX Division were \$87 million, or about 6% of the LANL total. DX operating costs for FY02 are projected to be approximately \$135 million.

At the start of FY02, the LANL workforce consisted about 7970 full-time-equivalent UC employees and about 1110 full-time-equivalent contract employees. DX Division employs over 400 workers, roughly 5.5% of the LANL workforce. Figure 0-3 shows overall DX workforce composition, and Figure 0-4 shows the distribution of the workforce across key and support processes.

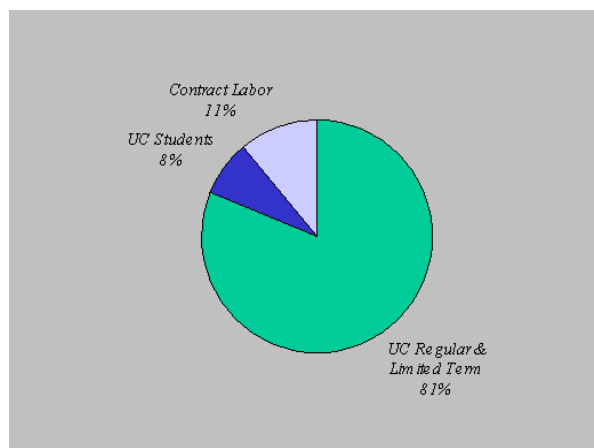


Figure 0-3. DX Division workforce composition.

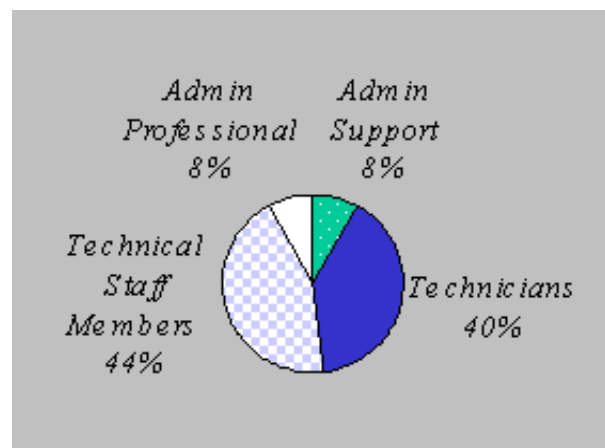


Figure 0-4. Distribution of workforce across process

The DX workforce is composed of 20% female employees and 80% male. Educational levels are

- 33% no college
- 12% associate degrees
- 18% bachelors degrees
- 32% advanced degrees
- 5% other

0.2 CUSTOMER AND STAKEHOLDER REQUIREMENTS

DOE, for whom UC operates LANL, is the ultimate customer for DX Division. All products and services are designed, either directly or indirectly, to carry out that portion of DOE's mission assigned to the Laboratory. In addition, the division has identified additional groups of stakeholders:

- division employees
- LANL customers, including technical programs and support divisions within the Laboratory
- stakeholders such as UC and the surrounding communities and pueblos

Each group of stakeholders has a specific set of environmental expectations for DX Division, as Table 0-1 shows. Those expectations inform our commitment to safe operations—including ergonomics—and efforts to minimize sanitary waste generation and resource consumption.

Table 0-1. DX Division's Key Stakeholder Segments and Requirements Related to Environment

Stakeholder Segment	Key Environmental Requirements	Driver
Division Employees	Provide a safe and healthy work environment. Help LANL meet key environmental goals.	Appendix F LANL Goals OSHA Requirements Environmental Regulations
Technical Programs and Support Divisions within LANL	Use good business practices (cost effective, timely, productive). Help LANL meet key environmental goals.	Appendix F LANL Goals Partnering with ES&H core support experts Environmental Regulations
External Stakeholders (DOE, UC, the general public)	Use good business practices (cost effective, timely, productive). Help LANL meet key environmental goals.	Appendix F DOE Orders OSHA Requirements Environmental Regulations
LA county, Eight Northern Pueblos, and Accord Pueblos	Maintain a healthy environment.	Responsibility to Neighboring Communities Federal and State Environmental Laws

In addition to the measures included in Appendix F, DX Division uses a variety of LANL institutional systems to structure operations. LANL's ISM system, in its broadest definition, serves as a basis for the institution's environmental management system (see Items 0.1, 1.1, 2.3, and 6.2). ISM, launched in 1996, is fully implemented. However, founded as it is on the CQI principle, improvement opportunities are systematically identified and addressed.

LANL's Performance Management System (see Item 5.1) helps leaders establish clear performance expectations for employees and ensures that those expectations are aligned with organizational goals and values. LANL mechanisms such as the annual Employee Checkpoint Survey (Items 5.3 and 7.2) and the Upward Appraisal Program (Items 5.2 and 7.2) also allow DX leaders to evaluate customer/stakeholder satisfaction with division performance.

For example, the functions of the DARHT MAP are to

- document potentially adverse environmental impacts of the Phased Containment Option delineated in the Final EIS
- identify commitments made in the Final EIS and ROD to mitigate those potential impacts
- establish action plans to carry out each commitment

Potential impacts are categorized into five areas of concern: general environment, including impacts to air and water; soils, especially impacts affecting soil loss and contamination; biotic resources, including impacts affecting threatened and endangered species, requiring noise and other impacts (habitat) monitoring for the Mexican spotted owl; cultural/paleontological resources, especially impacts affecting the archeological site known as Nake'muu; and human health and safety, especially impacts pertaining to noise and radiation. The commitment made to mitigate the potential impact is identified, and the scheduled plan for each commitment is described in detail, with a description of actions to be taken, pertinent time frames for the actions, verification of mitigation activities, and identification of agencies/organization responsible for satisfying the requirements of the commitment. For example, DX partners with DOE and the LANL RRES Division Ecology Group to periodically (at least annually) arrange for tribal officials to visit cultural resource sites within TA-15 (where the DARHT facility is located) that are of particular interest to the tribes. Consultations with the four Accord Pueblos continue in order to identify and protect any such cultural resources throughout the life of activities at DARHT. Evaluation of cultural and historical resources are also coordinated with the New Mexico Historic Preservation Officer, as appropriate, for concurrence of eligibility determinations and potential effects at all sites located within DX division.

Storm water pollution prevention (SWPP) best management practices are enforced at all of the firing sites within DX Division. Each firing site has an independent sub-plan containing site-specific information regarding operations, potential pollutants, and erosion controls. This plan addresses active firing sites listed on LANL's Hazardous & Solid Waste Amendment (HWSA) Permit and the Open Burn/Open Detonation (OB/OD) Part B Permit application. The DX Plan covers five additional sites that are not required by current regulation, since they are not HWSA or OB/OD sites. DX Division has established a SWPP Team whose operating members are responsible for developing and implementing the Plan requirements. The team members are selected because of their familiarity with firing site operations, the potential impacts of these activities, and with storm water run-on and run-off controls. The DX SWPP Team includes a representative of the RRES Water Quality and Hydrology Group, which exercises independent oversight. Currently, a Water Quality and Hydrology Group representative is deployed to DX to assist with the implementation of this effort. The core ES&H Water Quality and Hydrology Group have strategically placed storm water gaging stations in canyon bottoms tributary to our firing sites to quantify whether new contaminants are being introduced into the environment downstream from experimental operations.

0.3 SUPPLIER AND P2E2-PARTNERING RELATIONSHIPS

LANL is aggressively moving towards enhancing environmental focus in the ISM system. Consistent with an integrated system, direct responsibility and accountability for managing the DX Division's ES&H practices are shared with other LANL partner organizations. Throughout this application, we identify where spheres of responsibility and accountability for division ES&H practices are shared. Accordingly, when application criteria present a characteristic of environmental excellence to consider, we cite not only our own activities but also relevant activities carried out by partner organizations.

Over half of LANL's \$1.409 billion operating budget is for the acquisition of goods and services necessary for operations. LANL's Business Operations Division (BUS) is responsible for the oversight of these major subcontracts. The division's key suppliers are the approximately 40 vendors managed by the Just-In-Time (JIT) Program, which accounts for 71% of all institutional procurement transactions annually and the labor contract companies who augment the workforce.

BUS Division manages all supplier relationships under terms of the supplier contracts. Because key suppliers' performance directly affects the division and the entire Laboratory, quality expectations and performance requirements are clearly communicated. BUS Division representatives meet frequently and regularly with supplier representatives to evaluate performance and provide systematic, detailed feedback. One performance measure in Appendix F also measures BUS Division's ability to evaluate the overall performance of suppliers.

The Laboratory is moving in the direction of incorporating environmental components in many of the JIT product and labor contracts. Where applicable, BUS Division experts in affirmative procurement (AP), i.e., the purchasing of products with recycled content, ensure that routine products conform to any applicable environmental provisions, such as recycled content (see Item 7.1). Examples of JIT contracts that include a recycling requirement include those for toner cartridges, photocopy paper, and the use of daytime electronic calendars. JIT contracts will soon be let for recycled latex paint and absorbents. In the first quarter of FY02, LANL achieved an affirmative procurement rate of 98%.

0.4 COMPETITIVE SITUATION

Dynamic testing, pulsed power, and HE research facilities exist at other R&D laboratories managed by UC—Lawrence Livermore National Laboratory (LLNL) and Lawrence Berkeley National Laboratory (LBNL)—and at several other national

laboratories and academic institutions in the US and abroad. But no counterpart to DX, in terms of scope and mission, exists. It is therefore impractical to benchmark our performance against other facilities.

Nevertheless, both DOE and UC use the Appendix F measures to evaluate performance at LANL, LLNL, and LBNL, and the annual evaluations provide a means of comparing performance levels among the three institutions. Although not all Appendix F measures are applicable to all three laboratories, the side-by-side evaluation each year does provide useful relative information. Thus, as evaluated by key customers through Appendix F, both LBNL and LLNL can be generally considered competitors against which the Laboratory can benchmark its performance. Appendix F of the three UC-DOE laboratory contracts serves to standardize green requirements among these institutions. Appendix F performance affects competition for funds among the UC laboratories to the extent that the scores quantify DOE's level of customer satisfaction.

In a drive to incorporate best-in-class practices from the private sector into useful benchmarks, LANL has initiated its Internal Performance Indicators Program (see Item 4.1).

0.5 STRATEGIC CONTEXT

Recent improvements to the institutional ISM System (see Items 0.1, 1.1, 2.3, and 6.2) also allow all LANL units, including DX Division, to provide input to the Laboratory's identification of most significant environmental issues. Similarly, the ISM System allows key institutional issues related to the environment to become the focus of all work units, including DX Division.

DX Division has also begun focusing on several environmental thrusts recently implemented across LANL:

- recycling of unwanted mail through a process coordinated in BUS mail services
- paper reduction through double-sided copying, use of recycled paper, and use of electronic documents and calendars
- general recycling, e.g. cardboard, aluminum, oil, computer and electronic equipment salvage, through increased emphasis on awareness programs
- energy efficiency through awareness and improved equipment purchases
- reduced travel accomplished through carpooling, teleconferencing, and distance learning
- ferric chloride recycling

1 LEADERSHIP

1.1 ORGANIZATIONAL LEADERSHIP

The leadership system that supports environmental excellence in DX Division begins with the director of LANL, who in 1998, issued the Six Zeros vision for the Laboratory, which constitutes the institution's highest-level goals:

- zero injuries or illness on the job
- zero injuries or illness off the job
- **zero environmental incidents**
- zero ethics incidents
- zero people mistreatment incidents
- zero security and safeguards incidents

A comprehensive, proactive, ethics-based system cascades down from these leadership goals, which includes—as per the third bullet above—a goal to achieve environmental protection. DX Division interprets the “zero environmental incidents” goal broadly, to fully incorporate P2E2 core values.

The DX Division Director, her principal deputy, and eight group leaders make up the division's senior management team. Management sustains effective leadership throughout the division by

- ensuring pre-operational reviews prior to startup and restart of hazardous operations
- ensuring that quarterly self-assessments are performed
- participating in nested safety committee meetings, which begin with senior management and flow down to the worker level
- serving as champions or on teams
- ensuring that employee performance plans are aligned with business plan goals
- cascading information from management meetings to employees and teams
- participating in project specific preoperational reviews with involved workers
- ensuring worker involvement in the development of hazard control plans and operational procedures
- ensuring that worker training is current or attained for authorized workers

Division managers guide the organization by advocating uncompromising safety, by promoting P2E2 and resource conservation, and by recognizing and rewarding innovation and efficiencies in productivity.

Similarly, the goals focusing on safety and corporate citizenship broadly include concern and respect for the environment. To actively demonstrate managerial commitment to these goals, senior DX leaders have a locally assigned environmental team to achieve environmental excellence. In order to achieve environmental excellence the DX environmental team is involved in projects at DX, in most cases, from inception to operational status. This involvement helps to ensure that environmental issues are reviewed and addressed in an appropriate and timely manner.

An integrating framework that DX Division and LANL overall use as an environmental management system is ISM. The broad definition of “safety” encompasses all aspects of ES&H—including P2E2 and waste minimization (see Figure 1-1). The term “integrated” is used to indicate that the safety management system is a normal and natural element of the performance of work: safety is not a workplace add-on; it is how LANL does business. ISM supports LANL's goal “to accomplish its mission cost-effectively while striving for an injury-free workplace, minimizing waste streams, and avoiding adverse impacts to the environment from its operations.” ISM implementation is a major emphasis at LANL, and senior leaders formally review progress toward full implementation on a quarterly basis.

Each year DX leaders develop a detailed ISM Description Document for DX Division, DX-PLA-009,R0, that directly supports the overall LANL ISM Description Document. This document describes DX's vision, responsibilities, actions, and goals to achieve integrated safety management. In addition to reinforcing the applicability of institutional ES&H expectations to all DX Division organizations, personnel, and activities, this ISM description defines complementary expectations specific to DX Division. This document fulfills institutional expectations for an organization-specific ISM description. This document also applies to all LANL-operated facilities and activities at the Nevada Test Site, with the sole exception of Yucca Mountain.

Additionally, DX division is represented with the LANL E in ISM Committee and LANL team to revise the Integrated Resource Management Plan (IRMP), which is discussed on Item 2.1.

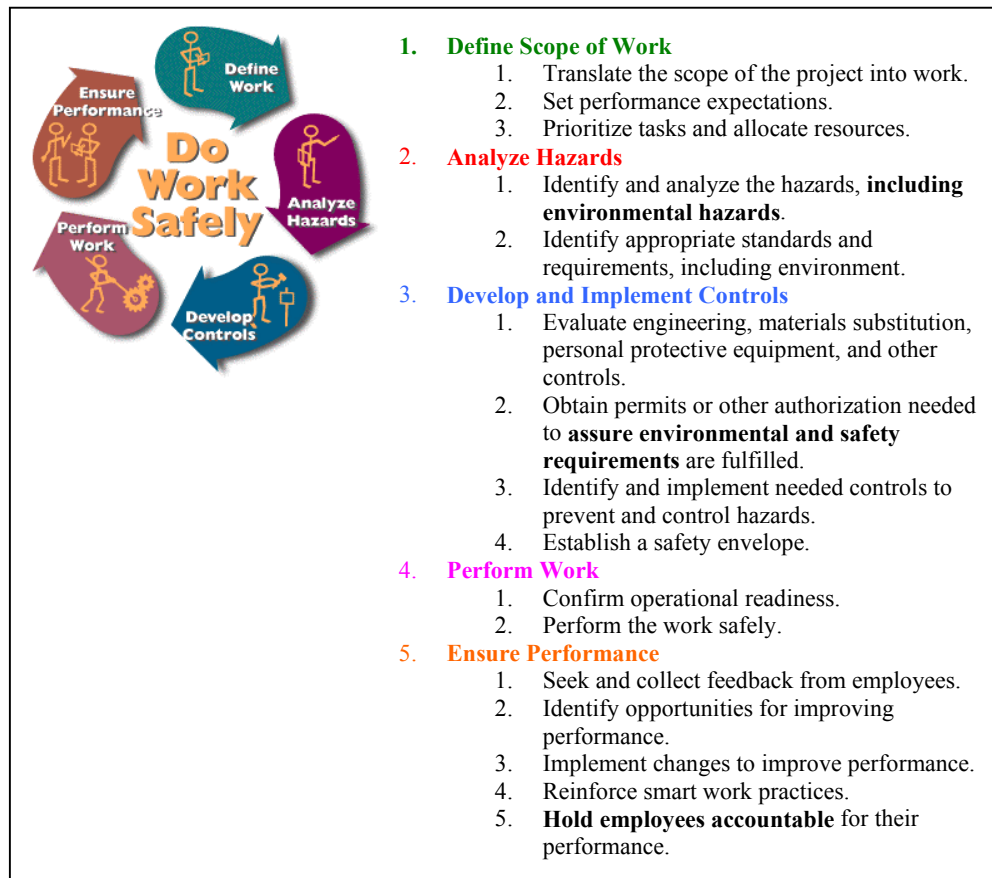


Figure 1-1. LANL's five-step process for ISM.

The ISM Project Office has established a detailed implementation schedule, available on an employee-accessible web site, and monitors all portions of LANL, including DX Division, to ensure that milestones are achieved and that performance goals are met. ISM featured two enhancements in 2001: reference to ISO 14000 series requirements for environmental management systems and implementation of ISM Self-assessments.

Each year, DX Division prepares a self-assessment against ISM requirements, through which the division establishes priorities, including those relating to P2E2. DX Division developed a Self-assessment Plan, PLA-DX-003, R.1, that outlines the approach by which self-assessments will be performed in DX Division to review work and worker behavior, with these goals:

- improving ES&H through observations and feedback
- improving the implementation of ISM in DX Division

In addition, the self-assessment process provides a means by which DX Division will identify, track, and correct issues identified either by the Division or by organizations external to the Division, such as the Internal Audits Group (AA-2).

The 2001 ISM verification audit resulted a noteworthy practice specific to DX's approach in feedback and improvement by targeting the Lessons Learned Program. A monthly lessons learned bulletin is developed by committee and posted in lavatories throughout the division. Topics vary from security to safety, to environmental issues. This is a simple yet an effective approach for getting the word out for feedback and improvement.

Another feature of ISM is the institutional Safety Concern Program (SCP), a no-fault partnership between workers and managers to identify and resolve safety concerns. The program is designed so that managers receive electronic notification of the safety concern, and the submitter receives periodic updates as the concern is tracked to resolution and closure.

The ISM system includes Laboratory Performance Requirements (LPRs), internal requirements governing the performance of work that are drawn directly from legal or contractual regulations. LANL has grouped the LPRs into six categories, including worker health and safety and environmental protection. Laboratory Implementation Requirements (LIRs) stem directly from the LPRs and provide detailed mandatory implementing requirements for the safe and environmentally responsible performance of

work. Laboratory Implementation Guidance documents provide detailed recommendations on procedures for putting LIRs into practice. See Figure 0-2. LIRs relevant to DX Division P2E2 performance are identified in the responsibility matrix set forth in Table 1-1.

Table 1-1. DX Division Responsibility Matrix for P2E2 LIRs

LIR #	Title	Responsible Party		
		Division Leader (or designate)	Group	Team
300-00-01/02	Safe Work Practices	Division Leader	All	
402-600-01	Electrical Safety			DX Electrical Safety Officers
402-550-01	Explosives	Division Operations Coordinator		DX Explosives Safety Committee
402-560-01	Beryllium Use			DX Industrial Hygiene Team
404 Series	Environmental Series	Division Management		DX Environmental Team

DX Division's management system is based on frequent and open communication. ES&H meetings are held at all levels of management and workers. They are

- Nested Safety Committee
- Division Management Team
- Group level
- Team level

DX Management holds all hands meetings (one to four times a year) that include ES&H topics and lessons learned. These sessions focus on expectations and progress toward goals, as well as ES&H issues. For example, ergonomics is a frequent topic at these meetings, as is waste management and lessons learned. In addition, senior leaders review operational procedures and hazard control plans for all projects, including process improvement efforts, to ensure work is being completed as scheduled and budgeted or to determine necessary adjustments to the plans and applying lessons learned from previous activities.

Senior leaders also conduct regular management ISM walkarounds. These informal but structured reviews allow leaders to observe working conditions throughout their areas of responsibility, to talk informally with employees, and to note potential areas for improvement. LANL has created nine categories of guidance cards, including environmental protection, that provide suggestions on the types of observations managers should make during walkarounds. Walkaround findings in the environmental category are tracked and analyzed by means of a web-accessible database called I-Track and are reported to the most senior LANL managers by the Associate Laboratory Director for Operations. (See Items 0.1 and 6.2 for information on the roll of quality improvement at the Laboratory.) In 2001, DX division managers including line managers performed 375 documented walkarounds. DX Management partners with institutional independent experts, local subject matter experts, and operators to conduct and advise. We are of the opinion that this approach enhances the quality of the walkaround.

Management commitment and/or involvement include the following:

- DX Environmental Team, which helps the division focus on environment
- Division Operations Coordinator
- Division ES&H Coordinator
- Group ES&H officers
- Preoperational (safety or readiness) reviews
- Waste Management Coordinators, who review waste data
- charter of improvement teams, e.g., online document system project, worker training/authorization

Information regarding organizational goals and current progress cascades to individual employees through the management structure. In addition to the DX all-hands meetings already mentioned, group leaders hold regular meetings with their staff to discuss programmatic issues. DX Division also maintains a web site with a wide range of detailed information for employees, customers, and stakeholders. One key part of the web site includes safety resources (see Figure 1-2).

DX DIVISION DYNAMIC EXPERIMENTATION

Home Mission Facilities **Safety** Security Organization Services Contacts Strategic Plan

Safety Information for DX Employees and Contractors

Core Capabilities

- Detonation/Shock Physics**
 - High Explosive Science
 - Detonators
 - Hydrodynamic Applications
- Instrumentation**
 - Accelerators for Radiography
 - Image Analysis
 - Optical Diagnostics
- Support Engineering**
 - Electronic/Data Systems
 - Machine Science & Technology
 - Field Operations
 - Experiment & Diagnostic Design

DX Online Document System (DX and DX Contract Personnel Only)
Required safety reading material for DX employees and contractors. After completing reading requirements, employees can report fulfilling reading requirements online.

Emergency Management & Response (S-8)
Provides Laboratory-wide emergency plans, preparedness programs, and oversight capability to respond and mitigate all LANL emergencies.

Emergency Response Planning Guide
Determine thresholds for chemicals to maintain the facility hazard category.

Health Services, ESH-2
Performs overall health surveillance of the work force, periodic medical evaluations, and fitness-for-duty assessments; manages care and rehabilitation of workers with work-related injuries and illnesses; evaluates health-related conditions of work sites; manages the Employee Assistance Program and the Wellness Center; studies the health of target populations.

[Home](#) | [Mission](#) | [Safety](#) | [Security](#) | [Organization](#) | [Services](#) | [Contacts](#)

[DX-1](#) | [DX-2](#) | [DX-3](#) | [DX-4](#) | [DX-5](#) | [DX-6](#) | [DX-7](#) | [DX-8](#) | [DARHT](#) | [FMU-67](#)

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Los Alamos
NATIONAL LABORATORY

Figure 1-2. DX Division's safety web page.

DX Division is fully committed to continuous improvement of all its operations. Such improvements usually include, either directly or indirectly, a reduction of waste generation or a decrease in needed resources. The E2 ethic has achieved acceptance at the division. Management provides leadership to its workforce in this area by addressing division-wide administrative, and facility management support staff briefings on recycling, waste reduction, and energy conservation. Additionally, DX has partnered with the RRES Prevention Program (PP) by hosting a representative to discuss LANL's Recycling Awareness. This year's Laboratory-wide recycling awareness campaign focused on actions that can be taken by individuals. The discussion for example, emphasized increasing the use of existing systems at the Laboratory, such as double-sided printing.

Division managers set organizational direction at DX strategic planning sessions (see Item 2.1). These sessions include a review of data and evaluation of past performance, including safety and environmental performance. The division's strategic goals, action plans, and targets derive from the needs and expectations of all key customer groups, as determined from LANL goals, Appendix F contractual performance measures, and division performance results.

Senior DX Division leaders communicate goals and action plans to employees through team, group, and all-hands meetings. In addition, the DX management team reviews goals and performance history. The planning process used by DX managers employs a line-of-sight process from high-level organizational goals to individual performance expectations. Group leaders develop group-level plans to support our goals. Using LANL's Performance Management System (see Item 5.1), managers then work cooperatively with employees to identify how each individual in the program is expected to contribute to the vision. This methodology has become a cornerstone for the operations within DX Division.

LANL employees are keenly aware of transportation issues and the need for reducing travel to a minimum, both from the post-September-eleventh standpoint of security and the purely routine standpoint of long-distance commuting (fully 4800 LANL employees commute 20 miles or more to get to work). The Laboratory actively promotes carpooling by establishing reserved parking for high-occupancy vehicles in congested areas and maintaining a web page, <http://www.lanl.gov/orgs/pa/News/rideshare.html>, to facilitate contact among prospective carpoolers. Teleconferencing is similarly promoted at http://int.lanl.gov/orgs/ccn/computingatlanl/bits/97october/Delores_VTC.html. Distance education by

means of teleconferencing, correspondence courses, and, especially, web-based learning is a prominent feature of training and professional development programs at LANL. Telecommuting capability for LANL employees is somewhat restricted for security reasons, but the Computing, Communications, and Networking Division Network Engineering Group makes accommodations for selected employees on an as-needed basis. In order to promote fuel efficiency and minimize vehicle congestion DX coordinates van pools to All Hands Meetings.

The DX environmental management system has posted a number of successes and sparked several P2E2 initiatives. The results of some of our successes are discussed in Category 7. Additional initiatives exemplifying the extent to which the P2E2 ethic now governs work at DX include projects such as

- Sump Decommission: HE Chemistry group's nonoperational wastewater sumps have been eliminated. Eight sumps at TA-9 (Detonation Science & Technology Group, DX-1) have been capped and protected so they no longer fill with rainwater that has to be treated at the HE wastewater treatment plant. This will avoid 40,000 gallons of HE wastewater. It also avoids the risk of sump overflow and release of contaminated water to the environment. This work was conducted by IT Corporation under the direction of DX-1 and the Environmental Restoration Project.
- Sustainable Design: A long-term plan to build a Sustainable HE Chemistry Laboratory for the High Explosive Science & Technology Group, DX-2, calls for the division to co-locate people and facilities within a campus environment at TA-22. The envisioned research campus will consist of 7 buildings. One of these is an HE Chemistry Laboratory. Today DX-2 HE work is located in a 1950s-vintage chemistry laboratory; current operations have evolved within the space constraints of the building. Laboratory space is used inefficiently due to the challenge of adapting new technology to an old facility. Productivity, safety, and environmental issues are key factors in justifying the new laboratory. To design it, DX-2 will partner with Project Management Division, chemists, line managers, project managers, and PP. This team will develop design elements in anticipation of establishing Functional and Operational Requirements and Mission Needs documents.
- In 1999, DX-2 applied Green Zia tools to waste management practices at DX-2 facilities, which identified promising P2 strategies (see Items 2.2 and 4.2).
- In 2000, DX ES&H personnel partnered with PP to incorporate Green Zia tools into analysis of DX laboratory operations (see Items 2.2 and 4.2).
- In an FY00 project supported by Generator Set-aside Fee (GSAF) funds, DX-2 collected 1000 gallons of used oil and recycled it (Item 3.3). GSAF funds are taxes levied on the division against every unit of certain wastes we produce.
- Sodium Hydroxide Stripper Reuse is a current project. Spent sodium hydroxide stripper has found a use at the LANL Radioactive Liquid Waste Treatment Facility, as an acid neutralizer.

In 2000, the DX-2 Group won a Green Zia Achievement-level Environmental Excellence Award from NMED for implementing projects like those mentioned above.

1.2 COMMUNITY LEADERSHIP

Ongoing consultations are proceeding with affected Native American tribes to ensure protection of resources of cultural, historic, or religious importance. The Laboratory liaises directly with the Eight Northern Indian Pueblos Council and has entered into a formal Accord (1992) with four pueblos (Cochiti, Pojoaque, San Ildefonso, and Santa Clara) whose members recognize sacred sites on DOE land. Additionally, such actions might include the following:

- hosting tours of DX land and holding operational briefings
- sponsorship of workshops or other meetings
- interactions with local, state, or federal government agencies
- support of local business by buying locally

Because it is part of the larger LANL organization, DX Division has limited interaction with the public on environmental issues. LANL has designated the Community Relations Division to routinely handle interactions with the public. Presentations, discussions, and workshops specifically focused on environmental issues are typically coordinated through RRES Division. Other community interactions take place through the many integrated outreach programs of LANL. DX Division is involved and/or represented in all of these institutional outreach activities.

A key aspect of LANL procurement, including that of DX Division, is to support, whenever possible, local vendors, especially small businesses and those owned by minorities and women. The BUS Division Small Business Office (SBO) has in place a number of programs that support small business and economic development in the region. Some of the programs include the Northern New Mexico Preference Program, part of Los Alamos Regional Purchasing Program, designed to strengthen regional business enterprises, stimulate greater regional employment and infrastructure, increase the business tax base in northern New

Mexico, and reduce regional dependence on the federal government. SBO this year also established the Historically Underutilized Business Program and has hosted several regional trade fairs to bring together small business owners with government and Laboratory procurement officials.

Each year, SBO establishes socioeconomic goals and northern New Mexico procurement goals. In FY01, LANL's procurements in northern New Mexico totaled \$357 million—\$11 million more than in FY00 and \$166 million more than in the DOE benchmark year of FY96. Whenever possible, DX Division attempts to purchase materials locally.

SBO has conducted a number of workshops and training sessions for small businesses interested in doing business with the Laboratory. SBO provides guidance to these businesses regarding such matters as establishing proactive P2E2 programs and using/providing products with recycled content.

The division tracks its performance in regards to the purchase of environmentally friendly products and items with recycled content. Results in Item 7.1 show both LANL's and DX Division's performance in supporting purchase of green products.

DX Division also contributes to LANL's highly successful environmental initiative Mail Stop A1000. This is an effort to recycle unwanted junk mail and other printed material. Division employees re-address unwanted mail to MS A1000, and LANL mail delivery personnel collect and sort the material as part of their normal mailroom activities. In FY00, the program recycled 212 tons of material and 397 tons in FY01. This program has received wide publicity both inside and outside LANL and in 1999 received a White House Closing the Circle Award. The Closing the Circle program, now in its sixth year, recognizes federal employees and their facilities for efforts that result in significant positive impacts on the environment in waste prevention, recycling, affirmative procurement, environmental preferability, model facility demonstrations, and promoting change.

Much of the material recycled through Laboratory P2E2 initiatives (Items 0.5, 3.2, and Criterion 7) is handled by the Nambé Recycling Facility, in partnership with LANL and LANL's support services subcontractor, Johnson Controls of Northern New Mexico (JCNNM). The Nambé Recycling Facility, based in nearby Nambé Pueblo, is a Native American-owned company that annually processes 5000 tons of concrete and asphalt, 350 tons of paper products, all types of glass, plastic types 1 and 2, and scrap metal.

All told, LANL and UC support at least 14 community outreach programs in northern New Mexico, some implemented by the Community Involvement and Outreach Office, others by such diverse entities as Environmental Restoration Project Outreach and the Tribal Relations Team. Virtually all organizations at the Laboratory are involved in outreach to some extent, with activities ranging from highly technical to purely charitable. Notable highlights include

- 39 educational programs annually serving between 1 and 2 thousand students, from kindergarteners to Ph.Ds
- 7 charitable funds, including the LANL Foundation, which has provided more than \$3 million, especially for scholarships, since its inception in 1997
- at least 50 technical user facilities

DX has received recognition for partnering to promote environmental excellence at LANL. In 1999 a diverse team of DX operations and facility management support personnel, together with deployed personnel from JCNNM, earned a Pollution Prevention Award in recognition of actions to protect the environment for the TA-36 Site Cleanup Project. NMED had concerns regarding this site due to debris in a watercourse from historical firing-site operations. The project was initially budgeted at \$750,000. DX Division Facility Management successfully cleaned up the site for less than \$100,000. About 45,000 pounds of metal was recycled. In summary, due to the innovative thinking on the part of the individuals who participated in this project, funds were saved, worker safety was addressed, a high-risk job was conducted safely, and a considerable amount of metal was recycled instead of being disposed of at the county landfill. See Item 5.3 for more information on Pollution Prevention Awards.

2 PLANNING FOR CONTINUOUS ENVIRONMENTAL IMPROVEMENT

2.1 PLANNING FOR ENVIRONMENTAL IMPROVEMENT

LANL has developed and uses as a guiding blueprint the Laboratory Strategic Plan, 1999-2004 (available at <http://www.lanl.gov/orgs/pa/News/StrategicPlan99.html>). The current LANL strategic plan sets out major programmatic objectives and strategies. It also identifies environmental objectives related to most major LANL goals. In addition, a major objective of demonstrating operational excellence in all activities specifically calls out the following strategies:

- Achieve measurable improvements in safety and environmental stewardship through full implementation of ISM [which includes P2E2] throughout LANL.
- Manage wastes and hazardous legacy materials effectively and accept the challenge of minimizing the generation of hazardous wastes in the future, with a long-term direction toward zero emissions.

Each year LANL also produces an institutional plan, a five-year perspective on LANL operations. The Institutional Plan FY 1999-FY 2004 (available at <http://lib-www.lanl.gov/la-pubs/00418669.pdf>) identifies strategic requirements for LANL organizational units, including DX Division; summarizes strategic, tactical, and programmatic plans; and helps ensure the integration of LANL activities with DOE priorities.

Finally, a cross-functional team of Laboratory employees, experts in subject matters related to environmental performance, meet annually to identify and set priorities for the institutional environmental performance. This process, based loosely on ISO 14001 principles, includes aspect identification and the creation of draft targets and objectives for improvement efforts. This information is then transmitted to the Laboratory's Safety Function Manager for the Environment, who prepares an annual summary of environmental concerns that is transmitted to senior Laboratory management for action. The goals established by this process are then assigned to LANL organizations called Issue Teams, which develop action plans, report planning status monthly to the E in ISM Team, and track implementation progress. The significant environmental issues addressed by these teams in 2001-02 are water conservation, elimination of ozone-depleting substances, reducing RCRA hazardous chemicals, and fire prevention. Item 6.2 identifies the overall institutional process for environmental improvement.

Based on LANL strategic directions, identified high-priority environmental improvement goals, and DOE requirements, DX Division then develops its own strategic plan.

Figure 2-1 gives an overview of the DX strategic planning process

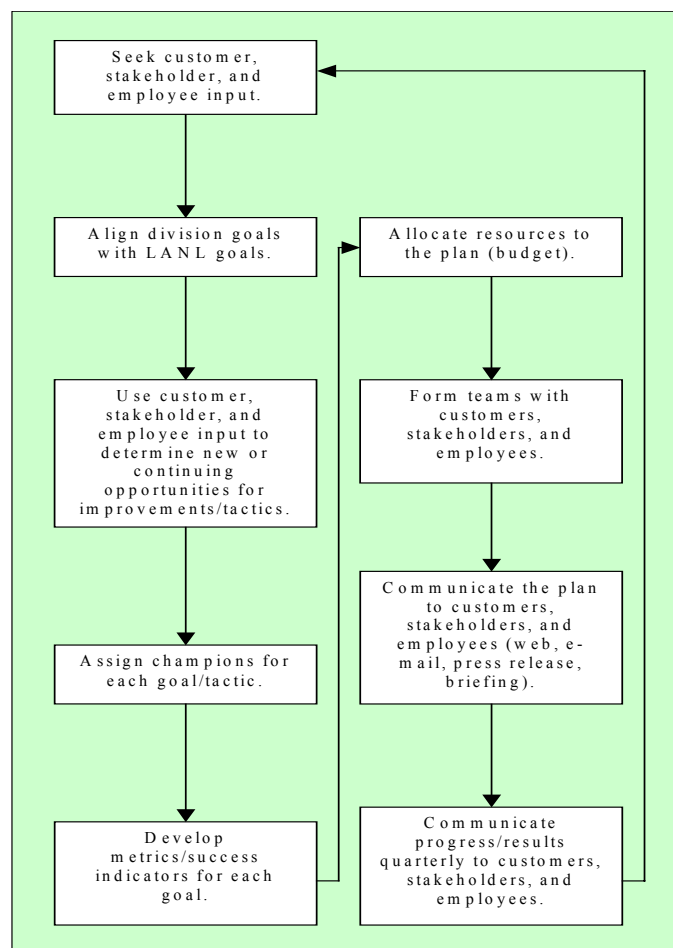


Figure 2-1. DX Division's strategic planning process.

The planning process includes input from each of the following:

- institutional strategic goals and objectives
- past performance, as documented through such activities as ISM walkarounds (see Item 1.1), as well as results from process improvement efforts (see Item 6.2)

- other operational results (see Category 7)
- general and specific measures from Appendix F that influence DX focus (see Item 3.1)
- employee feedback gathered through LANL's annual Employee Checkpoint Survey (Items 5.3 and 7.2) and the LANL Upward Appraisal Program (Items 5.2 and 7.2)
- the DX advisory committee that provides additional data on best practices and industry standards (see Item 3.3)

In addition, through senior leaders' negotiations and assessments with DOE and UC stakeholders, DX managers get a clear perspective of how stakeholders view our performance against LLNL and LBNL in the competitive environment (to the extent our fellow national laboratories can be considered competitors).

Participation in the New Mexico Green Zia Environmental Excellence Program this year, with accompanying development of appropriate measures and performance indicators, is another key element allowing the division to incorporate environmental focus into long-range plans. The exercise will provide DX Division an annual third-party, independent evaluation of successes and opportunities for improvement in environmental performance. Strengths and opportunities for improvement identified in the Green Zia feedback reports will be used in the ISM quarterly self-assessments (see Item 2.2).

DOE exercises high-level input into LANL strategic planning by means of the Integrated Resource Management Plan (IRMP), a strategy identified in the 1999 SWEIS to mitigate the environmental impact of operating the Laboratory. IRMP specifically addresses groundwater and watershed protection, air quality, energy consumption, waste management, and cultural-resource oversight. DX Division representatives have participated in the IRMP Planning, Management, and Review Team consultations in stakeholder review of the plan in June 2001. Full integration of IRMP and ISM is slated for October 2002.

2.2 ACTION PLANNING

After identifying goals, DX Division develops P2E2 actions, targets, and measurements of success. Because managers and employees recognize that inefficiency leads to waste, there is an ongoing effort to improve operations. Item 6.2 describes the method by which key division processes are analyzed and improved. These improvement efforts include action plans, which are regularly reported to management and tracked for successful completion when identified during ISM quarterly self-assessments.

Green Zia tools have proved especially useful in action planning. In 1999, the High-explosives Science and Technology Group, DX-2, applied Green Zia tools to waste management practices at DX-2 facilities, which identified promising P2 strategies, especially in connection with operations involving an HE formulation known as PBX. In 2000, the division partnered with PP to incorporate Green Zia tools into analysis of DX laboratory operations, including up-front planning for the HE Chemistry Laboratory, slated for completion in about 2011. These same tools are inclusive in the DX Division's strategic planning process. Also see Item 4.2.

DX Division's ISM quarterly self-assessment and implementation strategy for ISM focuses on how to involve all employees in making environmental improvement a routine part of all operations. In combination with the leadership systems previously described, these efforts also contribute to the development and execution of action plans.

Division-level ISM Quarterly Self-assessments demonstrate management ownership and accountability. The self-assessments are conducted by a team of DX Division members led by the Division ES&H Coordinator. To perform a credible self-assessment we identify the sources that provide relevant information. These sources include subject matter experts and preexisting data sources such as occurrence reports, accident reports, and management walkaround findings that include noteworthy practices. The focus of the self-assessment is on functionality, which usually requires direct observation of work. The results of self-assessments are documented and disseminated to the Performance Assurance Performance Indicators Group (PA-PI) and upward to the division's Laboratory directorate. A significance category is assigned to each issue identified, and feedback to the division and line managers ensure results.

The DX ES&H/Green Zia Team together with group-level organizations are responsible for determining how action plans will be implemented. Assignment of responsibility is determined on a case-by-case basis, with implementation often devolving upon the ES&H Team when a corrective action plan has been triggered by quarterly self-assessments, readiness assessments, maintenance requirements, equipment upgrades, or walkaround results.

Submission of this Green Zia award application is part of an ongoing division effort to more effectively and systematically focus on environmental performance.

Two very recent initiatives at DX serve to illustrate the division's approach to action planning. In both cases, specific P2E2 concerns triggered a well-defined processes mandated by the ISM system to gather information (Item 4.1), identify hazards to the environment and to workers, apply rigorous reviews (Category 4), and perform the work safely (Item 6.1).

Beryllium is a contaminant of concern at DX. Many of the experiments performed at DX Division involve components that contain beryllium. Some of the beryllium is necessarily aerosolized during firing operations and poses a short-term air-borne hazard to workers. As the particles settle out, the soil in the immediate vicinity of the firing site becomes contaminated.

Recognizing the implications of beryllium contamination, DX management adopted a comprehensive hazard control plan (HCP) in 2000, “Experiments Containing Beryllium and Operations at Beryllium Contaminated Sites.” This HCP mandates controls impinging on worker safety, such as personal protective equipment and air monitoring. As a concomitant to this HCP, in light of the environmental hazards, management also launched the Beryllium Release Abatement project, which takes advantage of a novel technology. A barrier such as a plywood enclosure, or other such nonhazardous material, is built around the firing site, and prior to detonation, the enclosed area is filled with foam. The amount and depth of the foam is determined by the size of the experiment, ranging up to 8 or 10 feet in depth and up to 30 feet across, or more. When the shot is fired, the foam captures the aerosolized contaminant, allowing it to settle. Technicians then collect the foam and dispose of it as per regulatory requirements, as determined from analytical data from samples of the foam taken during the collection process.

We anticipate this method of abatement to help reduce contaminants by a significant amount, to be reported in next year’s Green Zia application. An additional expected benefit from use of the foam and enclosures is to reduce the potential fire danger posed by the actual experiment and the fragments generated by the experiment.

The DX Stormwater Pollution Prevention Plans (SWPPPs) Reassessment was carried out in early 2001, and many SWPPPs were found in need of revision. As part of the SWPPP requirements, annual inspections of designated sites are required. Due to environmental damage to many of these sites, the DX ES&H team, in partnership with the RRES Water Quality and Hydrology Group, increased inspection frequency to once per quarter for all sites and reexamined the effectiveness of our best management practices (BMPs; “BMP” is EPA terminology denoting a suite of engineering techniques to control erosion caused by storm runoff).

DX has always implemented a vigorous program of erosion control, but the issue became more urgent in the wake of the Cerro Grande fire emergency in 2000. Accordingly, the division immediately implemented a series of surveys of burned areas to assess these locations for any areas of potential erosion concern. DX Division worked very closely with Facility & Waste Operations (FWO) and RRES Divisions to implement BMPs at burned areas, including installation of wattles behind contour-felled trees, reseeding with a special mix of native grasses, and straw- and hydromulching to promote soil stabilization and seed germination. Much of the work was conducted on steep canyon slopes. After these immediate fire recovery efforts, DX Division undertook a comprehensive review of areas not impacted by the fire but still under an SWPPP. The review culminated in all sites with SWPPPs having been reviewed and BMPs upgraded where necessary to prevent erosion and/or the potential for potential contaminant migration. DX Division is committed to performing regular inspections of these sites and assuring that any BMP maintenance or repair is carried out in timely fashion. See Figure 2-2.



Figure 2-2. Installation of a silt dike and increased rip rap at a storm drain near road construction. Note the silt fence along canyon edge. This BMP was carried out at TA-15, to assure regulatory compliance during the transition of DARHT from construction to operational activities.

2.3 INTEGRATION AND IMPLEMENTATION

A critical high-level driver is DOE Acquisition Regulation 970.5204-2, Integration of Environmental, Safety and Health into Planning and Execution. Certain key provisions of this acquisition regulation affect LANL operations in fundamental ways. These provisions mandate that LANL must

- adopt seven guiding principles of safety management that is fully integrated, Laboratory-wide
- integrate environmental protection into the concept of safety
- integrate environmental issues into hazard analysis
- adhere to DOE Work Smart Standards for worker, public, and environmental protection

To the seven guiding principles mentioned above, the Laboratory has added an eighth—management commitment and employee involvement. The result is ISM (Items 0.1 and 1.1).

Appendix G of the UC-DOE operating contract is the main mechanism that integrates DX strategic P2E2 planning—and strategic P2E2 planning in other divisions—with strategic planning Laboratory-wide.

Appendix F of the contract is the main mechanism that integrates DX performance—and the performance of other divisions—with Laboratory-wide performance measures (Items 0.4, 3.1, and 6.2 and Categories 4 and 7). The negotiation steps for Appendix F measures, the process to set priorities, the improvement steps, and the resulting evaluations (see **Error! Reference source not found.**) all help focus DX resources on key business practices and improve operational quality. The Appendix F process features quarterly division-level self-assessments, which are rolled up into an annual Laboratory-wide self-assessment (distinct from annual ISM Self-assessments) and evaluation by both UC and DOE. In connection with quarterly self-assessments, DX management meet with UC and DOE representatives to discuss current progress against goals and to identify any issues. Senior leaders also interact more often with DOE and UC customers on an as-needed basis. The regular and frequent interaction helps prevent surprises, mitigate problems, and create a cooperative rather than an adversarial atmosphere.

Section C of Appendix F contains about sixty operations and administration criteria—further broken down into specific performance measures—in nine functional areas. The contractual provisions that constitute critical measures of LANL—and by extension, DX—performance in the environmental arena are set forth in Table 2-1.

During the annual Appendix F assessment and appraisal process, examiners assign a score to a given performance measure according to a quantifiable “gradient.” The quarterly self-assessments allow managers to track resource allocations and to make any necessary adjustments to either funding or human resource allocations.

The division integrates strategic and action plans and ensures they are successfully carried out by the use of improvement champions or teams. This approach allows us a

- formal quality or improvement processes
- special tracking or performance measures
- a division business plan or some other planning document, formal or informal, that ties strategic and tactical goals to budget submissions

Before an action plan can be implemented, ISM calls for development of an HCP. All HCPs must identify work hazards—which most emphatically includes environmental hazard and controls. Managers must sign HCPs, and only properly trained workers are authorized by the HCPs to do the work. HCPs are generated for all activities, from office-type work through handling and using radioactive materials and explosives. Generally, these plans are originated by employees (those most familiar with the work to be performed and the controls required) and reviewed and approved by management. These plans constitute the authorization basis (AB) for performing the work at a given facility. (AB documents set forth a contractual agreement between DOE and UC in which DOE authorizes certain operations to be carried out at a facility on the basis of safety analysis report approvals, environmental reviews, readiness assessments, and other determinations. Also see Item 6.1.) Additionally, observations resulting from Pre-operational Reviews, HCP walk-downs, Readiness Assessment findings are tracked to closure to implementation.

HCPs must include

- a description of the work, in sufficient detail to make hazards clear to the reader
- a description of controls to achieve acceptable risk
- knowledge, skills, and abilities necessary to use the controls
- wastes, or residual materials, produced and how they must be handled
- environmental impacts and mitigation
- an estimate of the work’s residual risk with the control system in place
- a description of emergency actions to be taken in the event of control failure
- a change-control process for modifying the HCP and notifying affected people

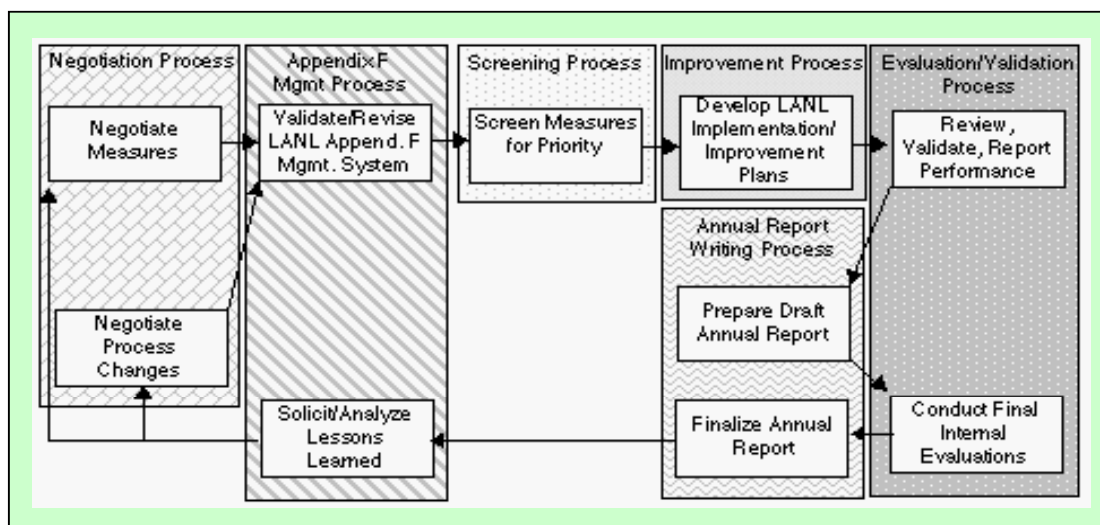


Figure 2-3. LANL Appendix F process (18-month continuous cycle).

Table 2-1: Appendix F Contractual Provisions for Operations and Administration

Functional Area	Performance Objective	Criterion	Performance Measure	Item
1 Environmental Restoration and Waste Management	1.0 Environmental Restoration	1.1 Progress in Completing Environmental Restoration Project Activities		
	2.0 Legacy Waste Management			
	3.0 Effective and Cost-efficient Waste Management Program	3.1 Specific Program Management Accomplishments	3.1.a Tracking and Cost Savings	
2 Environment, Safety, and Health	1.0 Do Work Safely	1.2 ISM System Effectiveness	1.2.a Environmental Performance	
			1.2.c Waste Minimization, Affirmative Procurement, Energy and Natural Resources Conservation, Pollution Prevention, and Transuranic Waste Minimization	1.2.c.1 Waste Minimization, Affirmative Procurement, Energy and Natural Resources Conservation, and Pollution Prevention,
3 Project/Construction/Facilities Management	3.0 Maintenance	3.1 Facility Sustainability		
	4.0 Utilities/Resource Conservation	4.2 Energy and Resource Conservation		

Another powerful tool for continuous integration and improvement is the ISM Environment, Safety, and Health Identification (ESH-ID) system, discussed in Category 4. This tool is not required by Division policy, however is encouraged when advised in the planning phase of programs, projects, and construction.

Development of clear strategic and action plans allows for full integration of performance requirements for each individual division employee. As Item 5.1 explains, objectives for each employee are designed to ensure that the organizational objectives

are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization.

3 CUSTOMER, SUPPLIER, AND OTHERS INVOLVEMENT

3.1 CUSTOMER INVOLVEMENT

Just as frequent and open communication marks DX Division's internal management practices, so does it characterize interactions with customers and stakeholders. The division is highly conscious of the need to fully involve all affected parties in seeking to improve the efficiency of work and to demonstrate a sustainability ethic in daily operations. The key process for involving customers is embodied in the performance measures found in Appendix F of UC's operating contract, which accomplish this objective by providing clear expectations, promoting accountability, and improving customer relations. Hence, Appendix F serves as a major vehicle for both determining customer requirements and performance levels for all of DX Division's customer segments. Table 3-1 shows a number of Appendix F criteria especially relevant to customer involvement.

Table 3-1. Appendix F Measures Relating to Customer Satisfaction

Operations and Administration Functional Area	Performance Measure	Focus
Financial Management	2.2.b	Effective reporting to customers
	3.1.a	Customer satisfaction
Human Resources	1.6.a	Customer feedback in workforce planning
Information Management	1.2.a	Customer focus in network services
Procurement	1.1.a	Assessing system operations
	1.2.a	Effectiveness; JIT Contracts
	1.3.a	Supplier performance
	1.4.a	Socioeconomic subcontracting
	2.1.a	Customer satisfaction rating
	3.1.a	Employee satisfaction rating
Property	5.1.a	Aligning customer expectations

DOE—our primary customer—drives the Laboratory toward greener practices (see Item 7.1) and, by extension, drives DX Division, as well. For example, in keeping with the DOE goal to realize an AP rate of 100% by 2005, both LANL and DX have achieved an AP rate of 98%.

The division interacts with its external customers via the LANL user facility program (go to <http://www.lanl.gov/partnerships/mechanisms/usrfac.htm>). Two DX user facilities open to the research community at large are the

- Detonation Science & Technology Facilities
- Explosives Pulse Power Facility

Our customer-focus approach is, of course, mainly oriented toward the research community involved in defense science, but we are alert for opportunities to extend our customer base into the private, non-defense-related sector. In 1999, a DX chemist investigating high-nitrogen energetic materials developed a nearly smokeless explosive capable of exhibiting intense colors on detonation. Disney Corp. subsequently licensed the invention, which holds promise for a new class of safer, less toxic fireworks.

All of DX Division's customer focus approaches are based on the model shown in Figure 3-1. Using the requirements and expectations data obtained by this model, the division can align its business plan with customer priorities. The model also helps the division take action to improve customer satisfaction and close the loop with the customer.

To monitor public perception, DX Division relies on an annual survey of public opinion, which LANL has conducted since 1998. The resulting reports profile New Mexico community leaders' awareness of and satisfaction with LANL operations. The survey also helps to identify current and emerging issues of importance to leaders in the region. In addition to asking about general perceptions of LANL, the survey allows respondents to voice their opinion of LANL's environmental responsibility. Results from the survey are recorded, analyzed, reviewed, and used in planning activities.

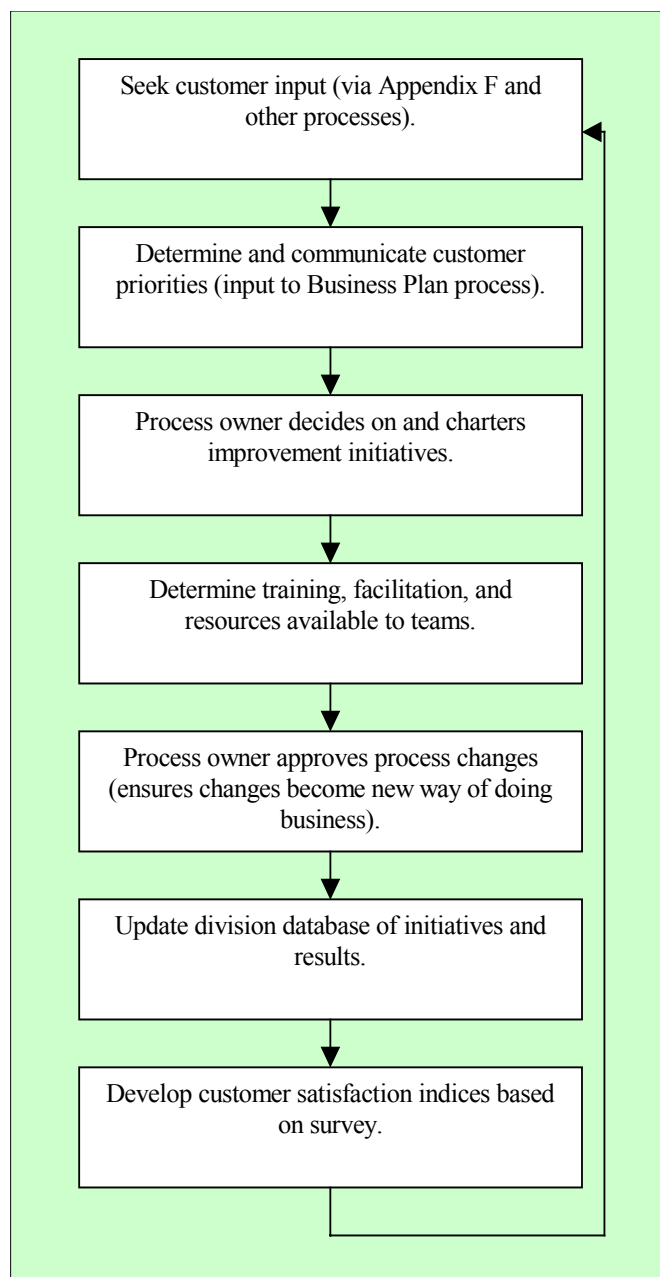


Figure 3-1. DX Division's customer satisfaction model.

3.2 SUPPLIER INVOLVEMENT

Most of DX Division's opportunities to interact with vendors on the basis of environmental concerns are limited. In addition, LANL financial policies require that most product/service purchases be coordinated through LANL's BUS Division. Specific supplier requirements are defined for each supplier in a customized contract, which is negotiated, implemented, managed, and evaluated by BUS procurement personnel. When data suggest that a change to the supplier's process be made, BUS Division provides a team to work with the supplier to improve its process using the classic plan-do-check-act—aka PDCA—process. BUS Division is also responsible for evaluating the overall performance of suppliers, as specified in Appendix F. Figure 3-2 shows the LANL contracting process, which DX Division follows.

Within its limited sphere of interaction with suppliers, DX does, however, employ several environmental considerations. For example, the division now ensures that vendors supply only computers equipped with Energy Star, an energy saver function that turns off the monitor's screen when the computer is not in use. The division also is making a determined effort to ensure that purchased office products, including paper, contain recycled content.

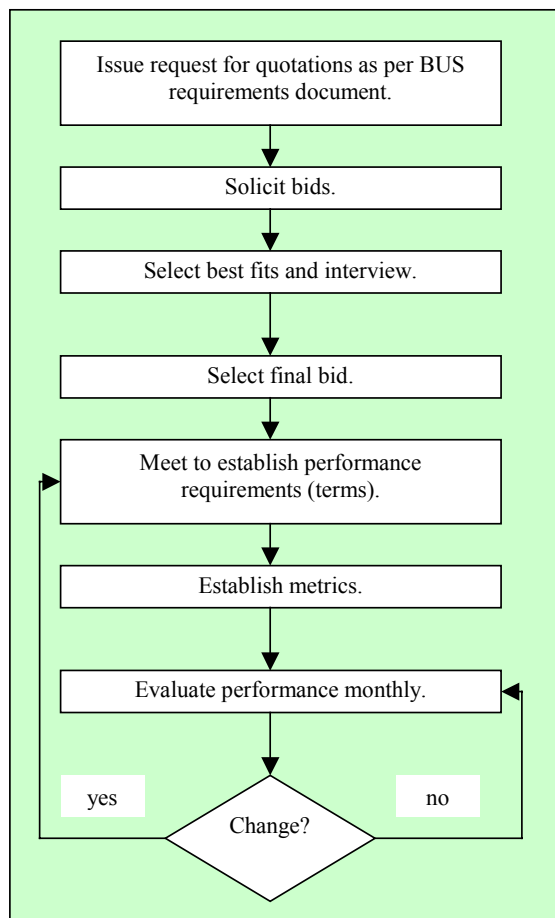


Figure 3-2. The supplier management process.

3.3 OTHERS INVOLVEMENT

DX Division has several partners internal to LANL that drive us in the direction of P2E2. As stated earlier, DX Division interacts with BUS to set up contracts and purchase requests. BUS is one of the key players in the Green Zia Environmental Excellence Program. Through its participation in the program, BUS has made several improvements to vendor contracts to incorporate green products.

RRES Division has primary oversight of our ES&H practices (which is understood in its broadest sense, to include environmental safety) and recharges us for services. FWO Division recharges DX about \$2.50 per kilogram for disposal of hazardous waste. Another tax on certain wastes we produce is levied by the GSAF program. GSAF funds, administered by PP, are specifically earmarked by LANL for P2E2 initiatives.

Three recent GSAF-funded projects exemplify environmental teamwork involving the division and its LANL ES&H partners. In a 1999 GSAF project, DX-2 collaborated with PP to fund an initiative that achieved an 18,000-gallon-per-month source reduction in wastewater generated by rinsing laboratory glassware. See Items 7.1 and 7.3.

In a 2000 project, DX-2 and PP arranged to allocate GSAF funds for installation of a recycling staging area. DX Division used the funds to buy a lockable storage shed called a transportainer to securely store oil on site for eventual recycling. Approximately 20 55-gallon drums can fit inside, allowing the oil to accumulate for almost a year until the recycler needs to collect the oil. The Return on Investment was determined to be 102%. Recycling the oil, rather than disposing of it, allowed DX to receive Appendix F credit.

Again in 2000, DX-2 and PP cooperated to implement a wastewater ozone-treatment system at an HE R&D facility. Wastewater from operations at the facility is contaminated with organic solvents and HE. In a new process, similar to ozonolysis of drinking water, hazardous organics are oxidized to CO₂ or other benign compounds. See Items 7.1 and 7.3.

Externally, division ES&H practices are regulated by EPA, NMED, OSHA, and NRC. RRES Division normally coordinates all direct contact with oversight agencies. DX Division supports RRES Division in preparing permit applications, meeting with regulatory agencies to provide technical input, and assisting RRES Division in conducting regulatory agency audits. RRES Division does have a close relationship with regulatory agencies to manage compliance. For example, RRES Division and NMED hold joint public meetings to provide new information. RRES Division provides funding to NMED for studies like the dose reconstruction project. DOE provides funding to NMED to staff an office in Los Alamos with oversight personnel.

LANL and DX Division participate in a process, triggered by RRES Division, to comment on regulations that affect our operations. The regulations in question pertain to RCRA wastes, NPDES water quality, and Air Permits.

LANL has a graded, systematic approach for reporting data and other activities. Routine monitoring data are reported in the annual Environmental Surveillance Report and Site Wide Environmental Impact Statement Yearbook. In the event of an accidental spill, any levels exceeding regulatory reporting limits are reported through RRES Division to EPA or NMED. Each division, including DX, develops an emergency response plan, which describes to whom and in what time frame information is reported. DX has formalized the incident and notification process that requires timely response should an unwarranted event occur at DX Division, that supports the DOE Occurrence Reporting and Processing System investigation process as required in DOE Order 212.1-1A. A root cause is identified for each occurrence, responsibilities assigned, and remedial measures defined. These occurrence reports are available to the public and to regulatory agencies at <http://drambuie.lanl.gov/~esh7/Finals/> and in LANL's public reading rooms. Additionally, the DX process requires reviews of all events for systemic issues, trending, and analysis and lessons learned that are, depending on significance, posted on a monthly basis.

The division has developed DX-specific procedures in connection with reporting, especially in support of LANL LIR 402-130-01.1, Abnormal Events.

Appendix F assessments and appraisals are the primary way that LANL communicates continuous environmental improvement goals to interested parties and receives feedback. This process is subject to significant third-party audits that provide independent evaluation of success. We also consider the evaluation to be provided by the Green Zia examiners as an opportunity to receive third-party, independent assessment of our continuous environmental improvement program and its results. Reports are prepared and distributed internally for all audits. Regulatory audit results and other continuous environmental improvement project data are published in LANL's annual Environmental Surveillance Report, the LANL Site Wide Environmental Impact Statement Yearbook, and DARHT MAP annual report that are all distributed to the public and other interested parties, including Tribal governors and regulatory entities. See Figure 3-3.

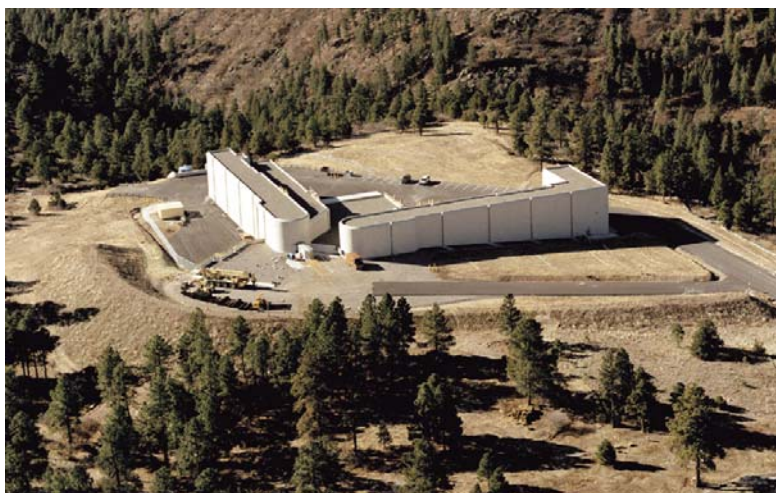


Figure 3-3. The DARHT Facility at TA-15. The dual axis makes possible detailed radiographic images of hydrodynamic events. DX has hosted tours at this site for Pueblo neighbors who wish to verify LANL's responsible stewardship of ancestral lands.

4 INFORMATION AND ANALYSIS

4.1 INFORMATION COLLECTION AND MANAGEMENT

The Appendix F Process is a key performance indicator of LANL contractual requirements with respect to information collection and management. See Table 4-1 for a listing of applicable Appendix F performance measures.

Table 4-1. Appendix F Measures In the Information Management Focus Area

Performance Measure	Focus
1.2.a	Customer focus in network services
1.3.a	Implementation of a records management system
1.5.a	Institutional-level management of enterprise data; customers address compliance issues; implementation of data architecture plan

Appendix F is also a primary mechanism that LANL uses to document organization-wide environmental activities, especially by means of division-level Quarterly Appendix F Self-assessments. Self-assessment input includes data on waste disposal, radiation exposures, internal laboratory audits, external audits by organizations like NMED, DOE-wide occurrence reports, internal Laboratory occurrences and lessons-learned reports, ISM walk-around findings, regulatory requirements, and DOE orders.

As stated in Item 0.4, Appendix F, which serves to standardize DOE green requirements among the UC Laboratories, is a compliance-based driver, depending as it does in large part upon lagging indicators. In keeping with the ISM principle to move beyond mere compliance, PA-PI has begun implementing the Internal Performance Indicator Program. PA-PI has developed a body of leading ES&H indicators from best-in-class practices. Leading indicators tracked by PA-PI include such key yardsticks as chemical purchases, ergonomics statistics, and preventive maintenance records for radiological facilities.

Management of information on materials input and waste is initially addressed in an institutional SWEIS. A new or modified LANL process not covered in the SWEIS is analyzed during the planning stage by the DX Environmental Team to make a NEPA determination. This team has been trained by the LANL RRES Ecology Group to become NEPA Biological and Cultural Authorized Reviewers and given the authority to act on their behalf. The DX Environmental team partners and maintains a direct link to the core group for assistance when necessary. In accordance with ISM Step 2, Analyze Hazards, the team identifies all potential environmental air or water releases, any solid wastes or wastewater that might be generated, any hazardous chemicals used, and other information needed to determine environmental impacts and safety concerns. Also in accordance with ISM Step 2, the team develops controls suitable for mitigating environmental and safety impacts of the hazard.

New processes or existing processes using new materials may require detailed examination using the NEPA screening tools or the ESH-ID process. When deemed appropriate or required, DX partners with RRES Division to post this information in the form of an ESH-ID. DX Division participates in the ESH-ID system on a voluntary basis. ESH-ID information is accessible on the LANL web where it is reviewed by DX subject matter experts, LANL multi-media environmental subject matter experts, and other Laboratory organizations who provide comments and feedback to a requestor. Required permits, notifications, mitigation requirements, waste generation, and other documentation needed are identified at this stage. The division ES&H team couples with the DX Environmental team to review the ID for P2E2 opportunities. RRES Ecology will review the project with regard to NEPA requirements to determine whether the work is significant enough to trigger a biological assessment, environmental assessment, or environmental impact statement, with DOE concurrence, to assure that there are no significant adverse impacts and that the project is environmentally sustainable, which may allow a categorical exclusion, as appropriate.

The ISM ESH-ID process, then, constitutes a key environmental information management system at the Laboratory. Some components include

- the ACIS (Automated Chemical Inventory System) chemical database, or some other chemical inventory database
- assurance that comments are addressed before the release of the ID
- partnership with FWO-SWO to track waste generation; the recharge numbers provide good tracking data
- tracking by means of GSAF numbers
- levels of waste generation
- levels of energy, water, or natural resource usage
- affirmative procurement percentages
- permitted exceedances, releases, fines, etc.
- cost/time savings from efficiency improvements

A new HCP may be required if the process or material hazards have not already been examined and appropriate controls put in place. HCPs are reviewed and revised, if necessary, depending on the type of activity, annually or every two years. HCPs also address environmental protection. However, DX has division-wide plans that specifically address the environment in the areas of SWPP, Spill Control and Countermeasures that require routine inspections and maintenance schedules. Additionally DX has standard operating procedures for a general housekeeping practice for outdoor activities. Routine inspections ensure that this is being done. Modification and maintenance of facilities always require ES&H reviews by the DX Facility Management Unit-67

Work Control team, who is made up of DX ES&H Officers, DX subject matter experts, Facility Coordinators, and JCNNM. See Item 6.1.

Finally, DX tracks information gathered through participation in LANL institutional programs. For example, senior leaders review results from LANL's public opinion survey and also analyze division-specific information from the annual Employee Checkpoint Survey (Items 5.3 and 7.2) and Upward Appraisal (Items 5.2 and 7.2). These data are reviewed and in some cases has identified a path for process improvements.

Life-cycle analysis affects all facets of planning at LANL. Specific LIRs and LPRs that address life-cycle planning include the LANL Comprehensive Site Planning Program, Construction Project Management Program, Project Management for the Acquisition of Capital Assets, Managing Facility Assets, Facility Configuration Management, and Managing Radioactive Waste. These documents require that projects analyze energy, waste disposal and reduction, environmental impacts from construction, and eventual facility decontamination and decommissioning life-cycle impacts.

Because LANL is not a production facility, true cost is not a factor that is tracked. Rather, Appendix F is used to determine whether the customer is satisfied with productivity, the cost, and the product.

PP tracks DX's (and all Laboratory division's) level of green procurement and a wide range of waste-generation metrics that include sanitary, hazardous, low-level, mixed low-level, and transuranic waste. PP presents these statistics to DX in quarterly reports and management-level meetings.

4.2 ANALYSIS AND DECISION-MAKING

Legally, the division is required to comply with all regulations and DOE orders. Prioritizing opportunities for improvement, then, is informed, first and foremost, by the findings of such audits or assessments (internal or external). Findings must be addressed by the responsible party. At the division level, such findings are typically addressed. In some cases the finding is tracked to closure in I-track with a target date for completion. I-track is an institutional management tool designed to notify the responsible party and line management of a pending action that needs attention.

Planning tools take many forms at the Laboratory and DX, including the Appendix F measures, HCPs, facility safety plans (FSPs), and AB documents (see Item 2.3), and all of these tools are brought to bear in the effort to improve products and services. The NEPA screening process, including ESH-IDs (Item 4.1), is not only a powerful information collection and management system but an effective planning tool as well, especially for identifying and pursuing opportunities for P2E2, cost savings, and risk and waste reduction. The result allows DX to recognize common needs and concerns that arise from them.

In recent years, DX has brought Green Zia tools to bear on certain pressing ES&H issues (see Item 2.2). In 1999, the High-explosives Science and Technology Group, DX-2, applied Green Zia tools to waste management practices at DX-2 facilities, which identified promising P2 strategies. In 2000, the division partnered with PP to incorporate Green Zia tools into analysis of DX-wide laboratory operations, including up-front planning for the HE Chemistry Laboratory, slated for completion in about 2011. The inquiry covered HE synthesis, analytic chemistry, wet chemistry, physical and mechanical testing, and QA/QC. Figure 4-1 shows how root-cause analysis has informed decision-making in this connection.

To the extent that Appendix F reporting compares environmental and safety performance against specific prevention-based environmental performance goals across the entire DOE complex, LANL uses this mechanism to gauge its achievements against its fellow laboratories—our primary competitors for DOE funding. The various measures and DX performance are described in Category 7. Item 2.3 describes how the comparative information is integrated into strategic planning, as well as action planning, to improve the environmental performance of specific projects/products. The ways that the Appendix F requirements for green trends are incorporated into project/product design have already been described throughout previous chapters of this application. Item 2.1 describes how Appendix F measures are used to set strategic direction for environmental improvement.

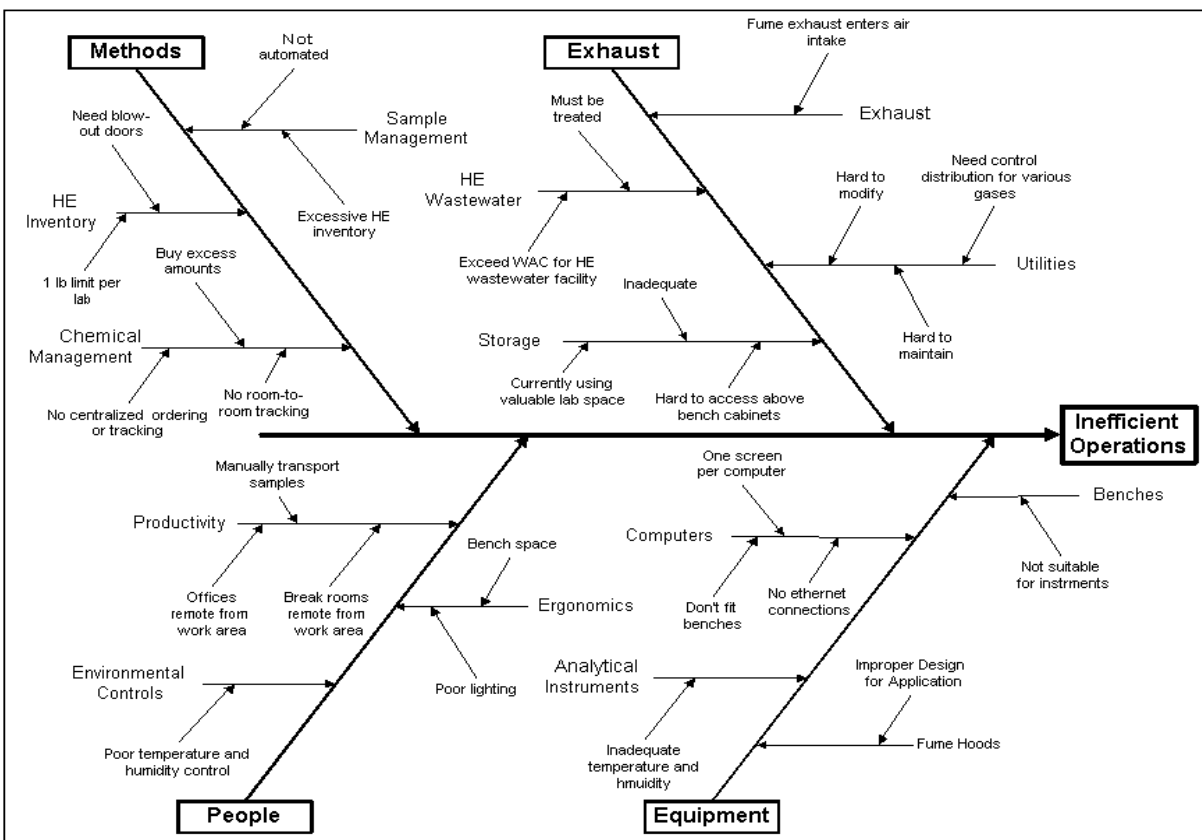


Figure 4-1. Green Zia tool root-cause analysis of DX laboratory operations.

5 EMPLOYEE INVOLVEMENT

5.1 EMPLOYEE EDUCATION AND SKILL DEVELOPMENT

Overall, employee-management relations at LANL are governed by the Performance Management System, launched by Human Resources Division (HR) in 1998 (see **Error! Reference source not found.**). The system requires all groups in DX Division to establish objectives that support the organizational echelons above them. Objectives for each employee are then designed to ensure that the organizational objectives are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization. The Performance Management System ensures clear two-way communication during the goal-setting phase of the process and provides a focus for ongoing discussion about work objectives and processes. Specific goals include

- aligning individual expected results with institutional goals
- identifying and assessing individual performance
- linking performance to rewards or consequences
- designing development plans to support improving performance in current jobs and/or increasing impact on the organization
- enhancing employee/manager ownership of individual and organizational performance
- improving two-way communication between supervisors and employees

A concomitant to the Performance Management System is LIR 300-00-04, Laboratory Training: A Graded and Systematic Approach to a Qualified Workforce. Employees fill out a questionnaire regarding the types of work they do. General training needs are identified by how these questions are answered (e.g., workers who use chemicals are required to take specific chemical safety and waste generator training). Division managers work with each employee to cooperatively prepare individual

development programs—both short-term and long-term—on an annual basis. It is the manager's responsibility to supply the resources (time, money, and support) to enable the employee to accomplish his or her development plan.

Once developmental goals have been established, employees may participate in appropriate training offered by LANL or other organizations. LANL's Health, Safety, and Radiation Protection Division offers over forty courses related to environmental issues, from general safety training and first aid to courses on such specific topics as packaging and transporting hazardous materials (see Figure 5-2).

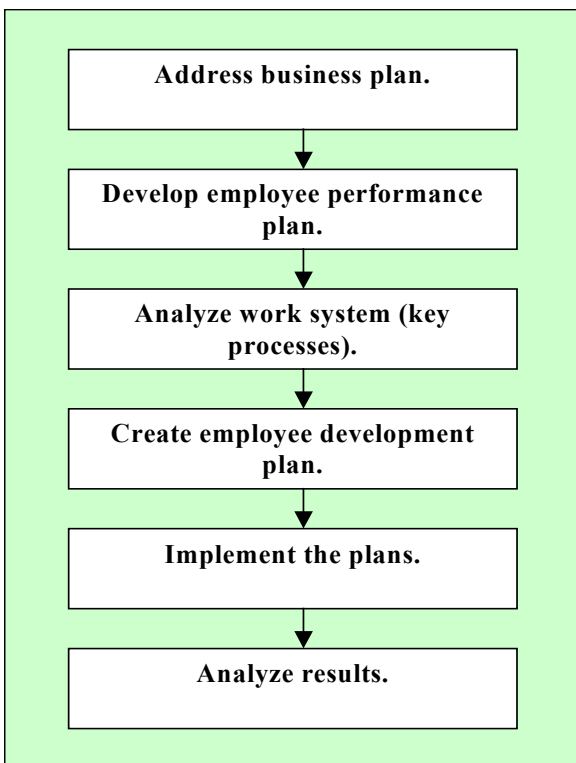


Figure 5-1. LANL's Performance Management System.



Figure 5-2. The Health, Safety, and Radiation Protection Division environmental training home page.

LANL training is evaluated by self-assessments, as is that of DX Division. Also, each worker receiving training evaluates the course. Training is modified in accordance with audit results and worker evaluations. In addition, training is developed for new regulatory requirements, with feedback forthcoming from the support and operating groups on the content of the training. DX Division partners with Health, Safety, and Radiation Protection Division, which has deployed a training generalist to work on site at DX. This individual tracks training commitments and establishes a training plan with line management to determine employee needs. This includes the environment.

To keep division employees abreast of salient environmental compliance issues, we rely on the DX Environmental Team and Training generalist to inform the field ES&H Officers to contact respective groups.

All employees are trained on the five-step ISM process, and their supervisors are trained in the development of HCPs. The worker's supervisor assesses the worker's job skills and training. If these are adequate, the worker is authorized to work under the HCP.

A key step in both the ISM and HCP-development processes is hazard identification and control, which includes environmental and energy hazards. Personnel who use chemicals or generate waste receive specific training that covers all aspects of P2, from substitution to recycling. The training reinforces the five-step process, which encourages creative thinking and novel approaches. This quality process has a feedback mechanism as the final step so that improvements recycle back into the system. New approaches and ideas are examined for compliance, safety, process improvements to enhance existing processes, and resource sensitivity. If these are met, the process can be modified and the new approaches implemented.

Continuous reinforcement of P2E2 practices, depending as it does on input from both managers and employees, promotes the environmental ethic throughout DX Division, beyond mere compliance with regulations. LANL's highest-level goals (see the Six Zeros, Item 1.1) encourages employees, as good citizens, to promote the environmental ethic in their communities. One key

process by which division employees actively address community issues is through coordinated volunteer efforts (Item 1.2), ranging from tutoring to foster care, with all-hands e-mail notifications requesting support sent out frequently and volunteer fairs organized annually. Many volunteer activities focus on environmental concerns:

- In 2000, the Community Involvement and Outreach Office coordinated employee efforts in community clean-up day in three surrounding cities—Los Alamos, Espanola, and Santa Fe.
- Following the Cerro Grande fire in May 2000, between 200 and 300 LANL volunteers (including many from DX Division) donated workdays and weekends to help with recovery efforts, especially during the immediate aftermath of the disaster, when operations at DX were still suspended.
- Again, following the Cerro Grande fire, a team of DX professionals were charted to evaluate DX land that was impacted by the fire, approximately 7000 acres, for ES&H and security concerns before general contractors were allowed in for remediation.
- In April 2001, LANL volunteers donated time to help the US Forest Service plant 12,000 seedlings as part of ongoing efforts to recover from the Cerro Grande fire.

5.2 EMPLOYEE INVOLVEMENT

As stated in Item 2.3, of the eight guiding principles that inform ISM, seven are mandated by DOE Acquisition Requirement 970.5204-2, and the eighth—a commitment to employee involvement—was adopted on the Laboratory's own initiative.

To facilitate communications, all division managers observe an open-door policy. Employees may also provide comments and observations at group meetings. DX employees keep abreast of our successes and failures in the P2E2 arena by contact with the DX Management Team and Environmental team.

Division employees take advantage of institutional mechanisms to minimize waste. For example, when employees have supplies, equipment, and materials that are no longer needed, the property administrator assigned to DX can ensure that it is re-used. Employees can also advertise unused equipment on the LANL electronic Swap Shop, where excess property is made available to other LANL organizations or to educational agencies.

Employees may discuss any P2E2 issue with the DX Facilities Manager, the ES&H Team, Environmental Team, and Waste Management Coordinators. PP has also established an electronic mechanism for soliciting employee input on P2E2. Employees can send comments, observations, or questions to wastenot@lanl.gov. The message is routed to the environmental specialist best able to respond, the sender will be notified of any proposed action, and PP will track the issue to resolution. The SCP (Item 1.1) serves a similar function with respect to safety issues.

Laboratory-wide, employee involvement in key P2E2 processes is an essential LANL business practice. For information on the roll of HCPs in action planning, see Item 2.3; for information on the roll of NEPA screening in planning and information management, see Category 4. For information on employee's input into HCP development, see Items 2.3 and 5.1; for information on employee input into NEPA screening, including ESH-IDs, see Category 4.

Laboratory policy on employee involvement in travel issues has been discussed in Item 1.2.

The annual Employee Checkpoint Survey (Items 5.3 and 7.2) and the Upward Appraisal Program provide mechanisms for employees to give anonymous input. The Upward Appraisal Program, in particular, sets specific expectations for managers to review feedback with subordinates and to develop action plans for improvement. Figure 5-3 shows the overall Upward Appraisal process. For more information on Upward Appraisals, see Items 5.2 and 7.2.

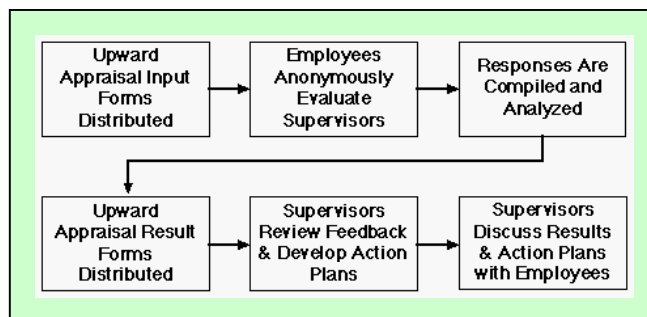


Figure 5-3. LANL's Upward Appraisal process.

Community involvement among employees has been discussed in Items 1.2 and 5.1.

Further examples of employee involvement include our participation in the E in ISM committee and in IRMP meetings. DX has developed a local Nested Safety Committee program pursuant to institutional guidance that commits us to achieve excellence in ES&H practices and in security. Worker involvement (upward) complimented with management commitment (downward) together create a conceptual framework for a successful integrated and uniform program, fostering employee-line involvement.

5.3 EMPLOYEE SATISFACTION, VALUE, AND WELL-BEING

A key LANL business practice requires that employee interests be taken into account when planning activities, the workplaces in which they will be conducted, the risks they incur, and P2E2 issues. For information on the roll of HCPs in action planning, see Item 2.3; for information on the roll of NEPA screening in planning and information management, see Category 4. For information on employee's input into HCP development, see Items 2.3 and 5.1; for information on employee input into NEPA screening, including ESH-IDs, see Category 4.

DX Division employees are also guaranteed by internal policy as required by ISM to provide input into planning the activities they carry out and their workplace environment. Worker involvement with the development of HCPs is common.

The ISM program requires managers to conduct monthly walkarounds in their areas, looking for and correcting ergonomic concerns, work area hazards, and environmental issues. Managers are encouraged to involve employees and subject matter experts in walkarounds and to conduct walkarounds too (see Item 7.1). These additional walkarounds increase the total number of walkarounds by 5-10%. The ISM database tracks deficiencies identified during walkarounds until the deficiencies are resolved and compiles the deficiencies to identify and improve safety performance. Division employees may also enter and track their own safety issues through LANL's web-based SCP (Item 1.1).

DX Division's major formal method for determining UC employee attitudes prevailing in the workplace—including attitudes on ES&H issues—is the annual LANL Employee Checkpoint Survey, conducted by the HR Division Training and Development Group. The survey has been conducted every year since 1994, except for 2000, because of the Cerro Grande fire emergency. Group leaders receive results from the survey specific to their groups. Managers are encouraged to share the results of the survey with employees. In 2001, HR distributed 7300 forms, 47% of which were returned. The survey contained 48 questions about career development, communication, diversity, job satisfaction, management, pay, productivity, performance management, safety and security. Selected results are presented in Item 7.2.

There are institutional incentives encouraging staff to work smarter and utilize innovative approaches to accomplish their work. The Pollution Prevention Awards Program, sponsored by PP, is open to all LANL employees and subcontractors. It is designed to encourage individuals and teams to develop plans, programs, or ideas for minimizing waste; conserving water, electricity or natural gas; reducing air or water pollution; or procuring products with recycled content. Recipients receive recognition and a cash award ranging up to \$125 from specially allocated congressional funds. Recent winners include

- LANSCE Division for Reuse and Recycling of Gamma Ray Detector Housings (2001)
- NIS-FMU-75 for Sanitary Waste Stream Reduction at TA-35 (2001)
- DX Division for Oil Recycling Staging Area (2000)

The Los Alamos Awards Program recognizes, by means of cash awards ranging up to \$2000, achievements among UC employees not only in purely scientific and technical fields but also for notable accomplishments in the ES&H arena and for significant contributions to enhancing the quality of work life at the Laboratory. In 2001, the Los Alamos Awards Program cited

- an ecologist with RRES Division for tracking the status of commitments to NEPA
- an ecologist with RRES Division for work with regional organic farmers in determining the effect of the Cerro Grande fire on their commercial produce
- a team from Engineering Sciences and Applications Division for hosting a summer educational program for promising engineering students

To provide emotional support, LANL provides an Employee Assistance Program whose main goal is to assist employees with personal problems that are affecting their job performance. The program offers a wide variety of presentations and workshops on such topics as stress management, gender issues, conflict resolution, and smoking cessation. The program also makes available a collection of books, videos, and audio tapes on workplace issues. All services are free of charge. Usually employees refer themselves; however, a supervisor can refer an employee if job performance has been identified as a problem.

As part of the larger LANL community, DX relies primarily on institutional programs to enhance employee support. LANL offers a comprehensive set of support initiatives along with feedback systems. Division employees are encouraged to use all LANL services that are appropriate and relevant to their individual needs, including

- the LANL Wellness Center, to provide comprehensive fitness and life-style services
- alternative workweek schedules, to accommodate diverse personal needs
- formal and informal grievance procedures, to address discrimination, harassment, and interpersonal-skills issues
- an Ombuds Office and Mediation Center, to provide structured approaches in conflict resolution

6 PROCESS MANAGEMENT

6.1 PROCESS CHARACTERIZATION AND CONTROL

Both DOE and UC stakeholders are active participants in establishing performance expectations and in appraising operational achievement through the Appendix F metrics and approval of AB documents. DX Division has a contractual mandate to continuously monitor and analyze its processes for potential improvements.

As discussed in Category 2, DX Division uses the five-step ISM process in strategic and action planning to identify environmental issues. These issues, and their resolution, become part of daily operations through the HCP process, which governs work at DX and the Laboratory. DX managers use the wide variety of data, including data from customers, employees, and operational reviews, to assess the performance of key processes. Representatives of funding organizations are involved in process evaluations through their input into the quality and usability of the final product or service. All partners in the project provide operational evaluations through the development and revision of HCPs. See Item 2.3 for more information on risk-management practices incorporated into HCPs, including those governing environmental risk.

Partners also provide operational evaluations through the ISM processes known as facility work control (FWC) and safe work practices (SWP). See Figure 6-1. The DX Division SWP-FWC process is designed to implement LIR 230-03-01, Facility Management Work Control, and LIR 300-00-01, Safe Work Practices. The DX implementation is available on the web at http://int.lanl.gov/orgs/dx/fmu_index.shtml.

This process is designed to

- involve the personnel at the location where the work is to be done
- ensure that ES&H concerns are addressed
- provide quality assurance checks that the work is done properly
- provide feedback to improve the process

The HCP and SWP-FWC systems, then, function reciprocally to enhance the efficiency of ISM. When subject to process analysis by means of Appendix F metrics, the success or failure of the HCP and SWP-FWC systems in managing environmental hazards is readily evaluated. The points in the systems where successes and failures occurred can be identified.

The process analysis mechanism is itself subject to scrutiny—most especially through exercises such as Green Zia award applications.

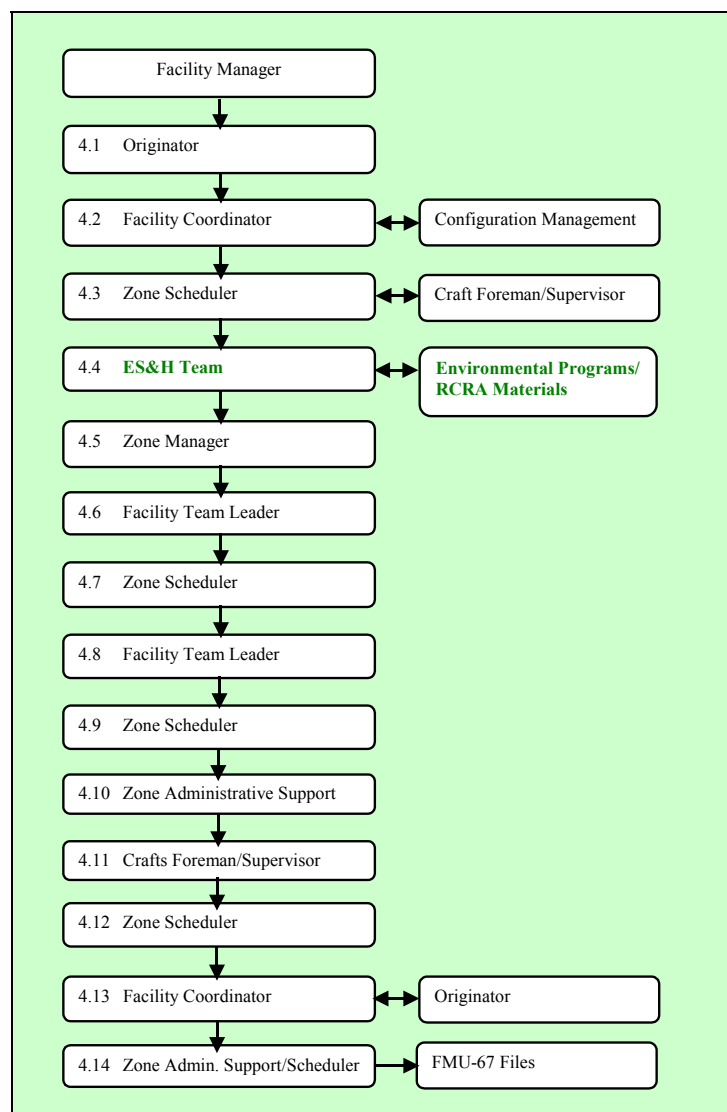


Figure 6-1. Our facility work control process, from Section 4.0 of the Facility Management Unit-67 Work Control Plan.

6.2 PROCESS IMPROVEMENT

As Item 6.1 explains, DX Division has a contractual mandate to continuously monitor and analyze processes for potential improvements. The use of Appendix F metrics by our primary customer, DOE (Items 0.1, 0.4, 2.3, and 3.1 and Categories 4 and 7), for process analysis and continuous improvement is a mature, eight-year-old system that has yielded significant upgrades in the way LANL does business. Item 2.3 describes how action planning and strategic planning integrate Appendix F metrics with ISM (especially by means of HCPs and ESH-IDs to prioritize areas for continuous improvement, both Laboratory-wide and in DX operations, as well). Item 6.1 describes how Appendix F metrics are brought to bear on the ISM SWP-FWC system, with a view to continuous environmental improvement. Our suppliers, too, are folded into process improvement; Item 3.2 describes how BUS Division procedures function continuously to align LANL procurement policy with evolving P2E2 standards.

The ISM mechanism requires each division, including DX Division, to assess its ES&H performance. ISM Self-assessment findings are institutionally reviewed by the high-level-management LANL F&IB, which sets Laboratory-wide improvement priorities and targets and annually develops an Appendix F Self-assessment Plan. At the division level, management becomes responsible for providing necessary resources to meet improvement targets and for monitoring progress. Figure 6-2 summarizes this process.

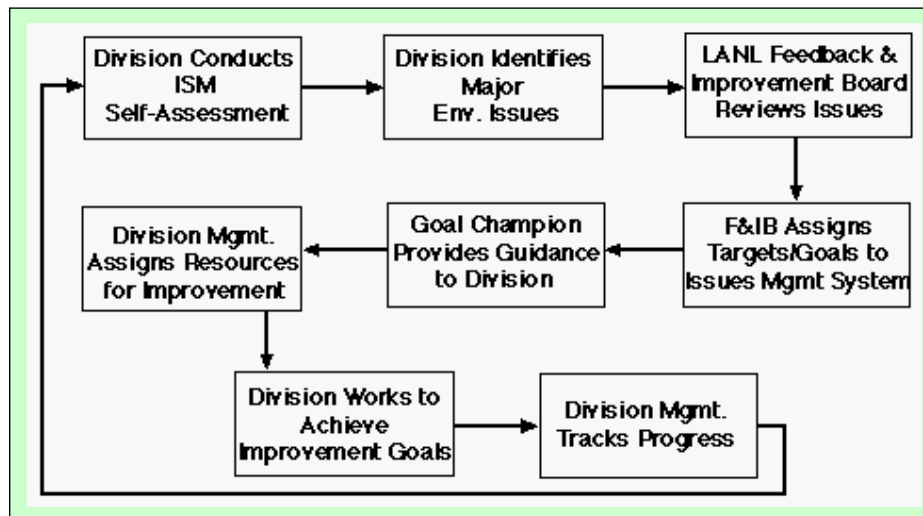


Figure 6-2. DX Division's improvement process based on Annual ISM Self-assessments.

Once priorities are established, action plans are developed in accordance with the principles outlined in Category 2 such that environmental improvement is integrated into daily operations, as described in Item 6.1.

Division management well understands that benchmarking against counterparts such as LLNL is a potentially productive exercise if we are to achieve environmental excellence in our class. The mechanism for benchmarking is Appendix F (see Item 0.4). While DX management has not yet fully incorporated formal benchmarking into the next round of strategic planning, certain P2E2 Appendix F metrics are amenable to a lab-to-lab comparison (see Category 7).

Results from improvement efforts and compliance success are communicated to senior leaders at management sessions and as part of the Quarterly Appendix F Self- assessments. Appendix F assessments permit benchmarking against other UC-managed Laboratories. Employees learn about process improvements at the all-hands meetings and through information published electronically or as memos.

Recognizing that the continuous drive to improve our performance at DX will achieve little unless we assure organizational learning, we manage information in ways that reinforce the P2E2 ethic. Information on our successes, including awards (see Item 5.3), is communicated to division personnel at group meetings and DX all-hands meetings. Successes are publicized throughout the Laboratory, mainly by articles in the online daily NewsBulletin (<http://www.lanl.gov/newsbulletin>).

DOE learns of results through formal institutional lines of communication, and other stakeholders (vendors, the community) are informed through BUS contacts or by means of public affairs initiatives. Annual publications also provide stakeholders with yearly updates on environmental performance. *For the Seventh Generation: Environment, Safety, and Health at Los Alamos National Laboratory* is an annual report prepared especially for residents of communities surrounding LANL. The *Site-Wide Environmental Impact Statement Yearbook* is another publication that evaluates LANL environmental performance and tracks progress toward established goals.

DX is quick to acknowledge failure, when appropriate. Management adopts a no-fault approach to communicating information about our P2E2 shortcomings, which we characterize as “opportunities for improvement.”

As stated above, DX Division has a contractual mandate to continuously monitor and analyze our systems for potential P2E2 improvements. Further, we have a strong financial incentive to do so. The cost of permitting, handling, and disposing of waste is a significant fraction of our operating cost. All told, a solid track record of P2E2 achievement implies that our process improvement systems are producing the desired outcome, as evidenced by the results (detailed in Category 7) that we have posted in

- materials reduction
- water conservation
- energy conservation
- waste recycling

7 RESULTS

Throughout this chapter, we reference various provisions of the DOE-UC contracts governing LANL, LLNL, and LBNL operations. All provisions referenced are contained within Appendix F of the contracts, Section C, Operations and Administration. The performance objectives, criteria, and measures (POCMs) mandated by Appendix F are our best tool for gaging the level of satisfaction with which our main customer, DOE, regards our work. The scores DOE awards on given POCMs apply to the institution as a whole. In Category 7, we present institution-wide Appendix F results in cases where DX substantively contributes to the Laboratory's performance or in cases where an organization with which DX directly partners is primarily responsible for the Laboratory's performance (e.g., BUS Division is primarily responsible for the Laboratory's performance in the area of supplier management).

Appendix F scores are expressed as a percentage, with corresponding ratings assigned as follows:

<=59%	unsatisfactory
60-69%	marginal
70-79%	good
80-89%	excellent
90-100%	outstanding

Each UC-managed laboratory renegotiates its contract each year. There is no necessary laboratory-to-laboratory consistency in contract provisions, nor is there any necessary year-to-year consistency. On the whole, however, we can identify a counterpart for most POCMs, laboratory to laboratory and year to year, thereby affording useful benchmarks over time. A complicating factor to bear in mind when comparing laboratory-to-laboratory performance is that, while we report DOE scores for LANL, we are obliged to report UC self-assessment scores for LLNL and LBNL, which may skew these institutions' scores slightly upward, relative to LANL.

Also in this chapter we present DX-specific results, including results for three projects that have a significant effect in terms of direct P2 impact and in terms of our bottom line:

- Wastewater Source Reduction Initiative
- Photo Film Substitution
- Etchant Solution Recycle

7.1 ENVIRONMENTAL RESULTS

One of the most important Appendix F provisions relating to environmental excellence is 2-1.2.c.1, Waste Minimization, Affirmative Procurement, Energy and Natural Resources Conservation, and Pollution Prevention. This provision keys to DOE Directive "DOE 2005 Pollution Prevention, Energy Efficiency Leadership Goals," 11/12/99, and assesses three indexes:

- P2 performance
- successful pilots of P2 best practices on a Laboratory-wide basis
- implementation of P2 opportunity assessments using the New Mexico Green Zia tools

The P2 performance index is itself broken down into nine parameters. Data on six of the most critical are presented later in this item.

LANL POCM 2-1.2.c.1 is not directly comparable to any LLNL or LBNL POCM. LLNL 2-1.2.f, Waste Reduction and Recycling, and LBNL 2-1.2.h, Waste Reduction and Recycling, constitute a much more restricted measure of P2 performance, addressing waste reduction and recycling, only. We show these restricted measures as benchmarks against which to assess LANL performance, in Table 7-1. To the extent that laboratory-to-laboratory comparison of these POCMs is meaningful, we note that overall, LANL scores have lagged behind those of LLNL and LLNB. Nevertheless, there is a distinct uptick in the LANL score from FY00 to FY01, while those of our sister institutions show a flat or downward trend.

Appendix F provision 3-4.2, Energy and Resource Conservation, also has significant environmental implications. This POCM addresses the extent to which energy and resource conservation initiatives are managed in accordance with a comprehensive program management plan, a plan that sets forth a schedule of goals and tracks progress. It is very roughly comparable to LLNL 3-5.3, Energy Management, and to LBNL 3-5.3, Energy Management. See Table 7-2.

Table 7-1. Appendix F P2 Scores for Three Institutions

	LANL	LLNL	LBNL
FY99	80%	Not scored	95%
FY00	80%	92%	92%
FY01	85%	85%	92%

Table 7-2. Appendix F E2 Scores for Three Institutions

	LANL	LLNL	LBNL
FY99	88	98	98
FY00	95	98	98
FY01	85	95	Not scored

Turning to DX-specific results, we anticipate that some of the most significant dividends accruing from our P2E2 programs will come from our Wastewater Source Reduction Initiative. This undertaking, a work in progress, has engaged the best efforts of process engineers at DX-2, the High Explosive Science & Technology Group, for over six years. The HE Science & Technology Laboratory, housed at TA-9, Building 21, was commissioned in 1952. Operations at this facility produce significant quantities of HE-contaminated liquid waste, which originally was collected in a sump and released to an outfall. In 1996, to halt releases, DX-2 plugged the sump outlet—in effect, converting the sump to a storage tank—and began sending sump water via tanker truck to the HE Wastewater Treatment Facility, operated by our partners at Engineering Sciences and Applications (ESA) Division. Because ESA levies a recharge to process our waste, DX-2 launched the Wastewater Source Reduction Initiative as a cost-cutting measure.

Sumps do not make good storage tanks. For one thing, rainwater contributes to the sump, obliging us to process natural precipitation as liquid waste. Further, lacking precise instrumentation, we could only make educated guesses on when to schedule tanker truck pickups. Finally, the sump leaks. In 1999, we augmented our waste handling system with three specially-configured 2000-gal. storage tanks to receive sump water. This stratagem allows us to optimize tanker truck pickup scheduling: only fully loaded trucks leave our facility, and they only carry wastewater, not rainwater. Additional economies have been realized through a number of ancillary DX-2 projects, including, but not limited to, the following:

- **Chemlab Rinsewater Reduction**—In a 1999 project underwritten by \$110,000 in GSAF funds, DX-2 collaborated with PP to achieve an 18,000-gallon-per-month source reduction in wastewater generated by rinsing laboratory glassware. The rinsewater—contaminated with HE and other chemicals—must be stored, pending analysis. Previously, each batch of glassware required two gallons of water to rinse. With the purchase of two high-performance, energy-efficient Miele chemlab dishwashers, we now use only 0.3 gallons of water per batch.
- **Wastewater Ozone Treatment**—In 2000, DX-2 and PP cooperated to direct GSAF funds toward installation of a demonstration ozone-treatment system at Building 21. In a process similar to ozonolysis of drinking water, wastewater contaminated with organic solvents and HE are oxidized to CO₂ or other benign compounds. Previously, ESA processed significant quantities of our wastewater by sorption onto carbon beds, or, if the wastewater exceeded certain organic-solvent limits, FWO disposed of it by heat treatment. Either route was expensive, not only because of treatment costs but also because of analytic costs.
- **Wastewater Tank Monitoring and Notification System**: In 1999, we initiated a project to upgrade data acquisition in our holding tanks. Advanced software processes the data and monitors automated valves and pumps to optimize water levels and transmit timely notifications of leaks and other off-normal events.

Another project that has yielded notable results is Photo Film Substitution. The Hydrodynamic Applications Group, DX-3, has substituted photographic film used in nuclear weapons mock-up explosives tests with phosphor-scan imaging. Phosphor scanner eliminates photographic waste and improves radiography performance. DX-3 has procured and is installing a large format phosphor scanner that enables two large phosphor screens to replace photographic film in explosive hydrotest radiographs. Approximately 450 gallons of spent photo chemicals per year are no longer generated, and the administrative activities associated with storing, characterizing, documenting, and disposing of this waste have been eliminated.

The Etchant Solution Recycle Project has addressed one of our most problematic waste streams. The Detonation Science & Technology Group, DX-1, has sent 220 gallons of spent ferric chloride etchant solution to a California recycler, who will remove and recycle the copper and purify the ferric chloride for reuse. Recycling this waste stream via this route will avoid 4,000 kg of RCRA hazardous waste annually. As this waste stream is a significant percentage of the Lab's routine hazardous waste generation, recycling will be a major factor in meeting DOE's 2005 hazardous waste minimization goal for LANL.

Salient financial results of the Wastewater Source Reduction Initiative, Photo Film Substitution, and Etchant Solution Recycle projects are presented in Item 7.3.

As DX's mission and facilities are unique, it is not particularly meaningful to identify competitors against which we can benchmark our environmental and worker health and safety performance. We find it more useful to compare our division-level performance with LANL as a whole.

A serviceable tool for comparing DX's performance to that of LANL as a whole is the Quarterly Appendix F Self-assessment, which tracks current levels and trends in ISM's impact on our environmental performance. Consistent with a Laboratory-wide standard for reporting, we post a RCRA self-assessment index based on inspections vs. findings—with findings broken down into

twelve key environmental performance parameters, such as waste determinations, labeling, and exceedance limits. The lower the index, the better the performance. LANL's directorship monitors quarterly division-level self-assessments indexes from across the Laboratory, as an indicator of the institution's likely performance on the annual DOE Appendix F Assessment. Early warning of a division's failure to meet expectations automatically triggers a Management Action.

The LANL RCRA self-assessment index for all of FY01 was 0.07; for the first quarter of FY02, it was 0.03. DX indexes for the corresponding periods were 0.05 and 0.01. These results are consistent with DX's commitment to match or exceed LANL-wide performance.

Six critical parameters of the nine addressed in the P2 performance index, POCM 2-1.2.c.1, are hazardous waste generation, low-level waste generation, mixed low-level waste generation, solid sanitary waste generation, solid sanitary waste recycling, and affirmative procurement (AP). All parameters are associated with specific DOE goals for the Laboratory, as prescribed in DOE Directive "DOE 2005 Pollution Prevention, Energy Efficiency Leadership Goals."

Trends in waste generation indicate that LANL is on track to meet or exceed DOE's goals for 2005. The overall LANL hazardous-waste generation rate has averaged a 20% annual decrease since 1997. The very nature of our business practices at DX requires us to generate large quantities of hazardous waste. But with the implementation of the Etchant Solution Recycle Project mentioned above, and the recycling of 4000 kg of spent ferric chloride per year, a significant reduction in the institution's hazardous waste stream—representing 8.7% of the LANL total in FY01—keeps the Laboratory on track to meet DOE's 2005 goal sometime in 2003. Meanwhile, the DX contribution to low-level and mixed low-level waste generation rates at the Laboratory are negligible. See Figure 7-1, Figure 7-2, and Figure 7-3.

While data for solid sanitary waste generation are available for the Laboratory as a whole, they are not available for DX or for any other LANL division. However, FWO has deployed a new fleet of PackMaster collection trucks equipped with scales, which in the future will allow the Laboratory to track waste generation by Facility Management Units, if not by division. See Figure 7-4.

The LANL-wide recycling rate for solid sanitary waste was 41% during FY01 and 75% during the first quarter of FY02. The Laboratory appears on track to far exceed the DOE 2005 goal of 45%. LANL will not begin collecting division-specific solid waste recycling-rate data until later this year. With next year's Green Zia application, DX will be able compare our own recycling-rate record with that of LANL.

The AP rate called out in Appendix F is defined as

$$\frac{\text{purchases of products with recycled content} + \text{purchases of justified virgin products}}{\text{total purchases of EPA - designated items}}$$

EPA-designated items are those identified in the EPA Comprehensive Procurement Guidelines. BUS Division, which manages procurement at LANL, specifies in contracts let to vendors that any item advertised as a product with recycled content must meet the standards set forth in EPA guidelines. LANL and DX AP rates are compared in Figure 7-5. An equally useful measure of green purchasing is the recycled purchase rate, defined as

$$\frac{\text{purchases of products with recycled content}}{\text{total purchases of EPA - designated items}}$$

LANL and DX recycled purchase rates, both highly favorable, are compared in Figure 7-6.

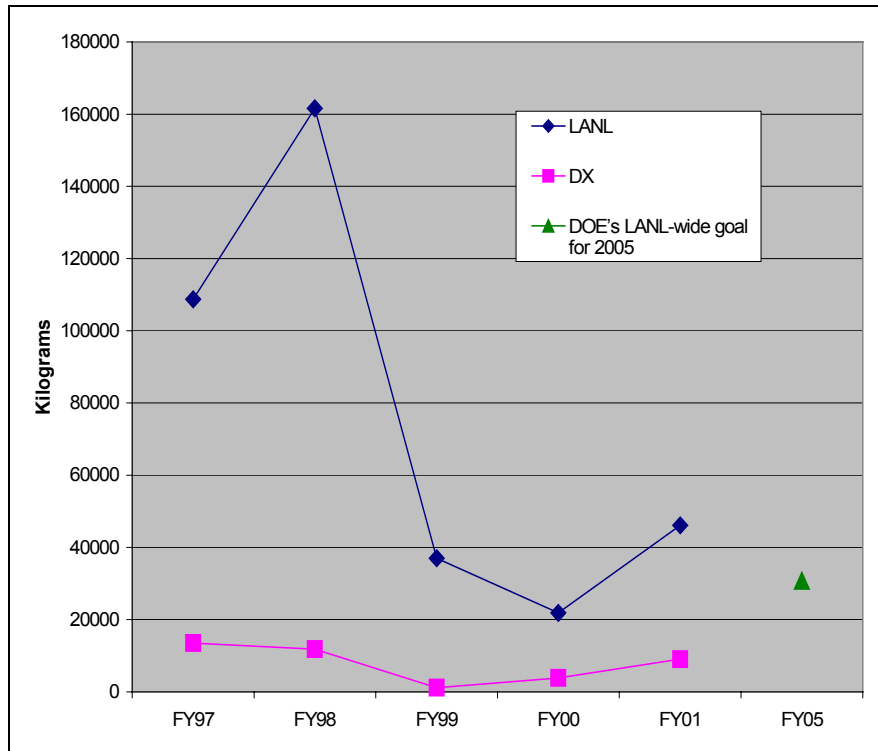


Figure 7-1. LANL and DX hazardous waste generation results.

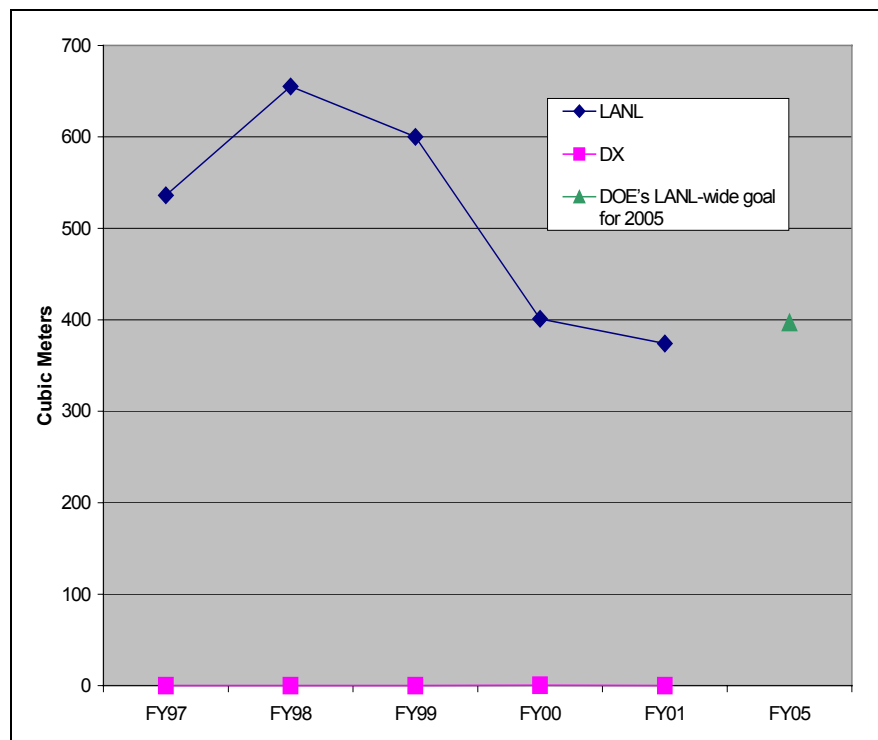


Figure 7-2. LANL and DX low-level waste generation results.

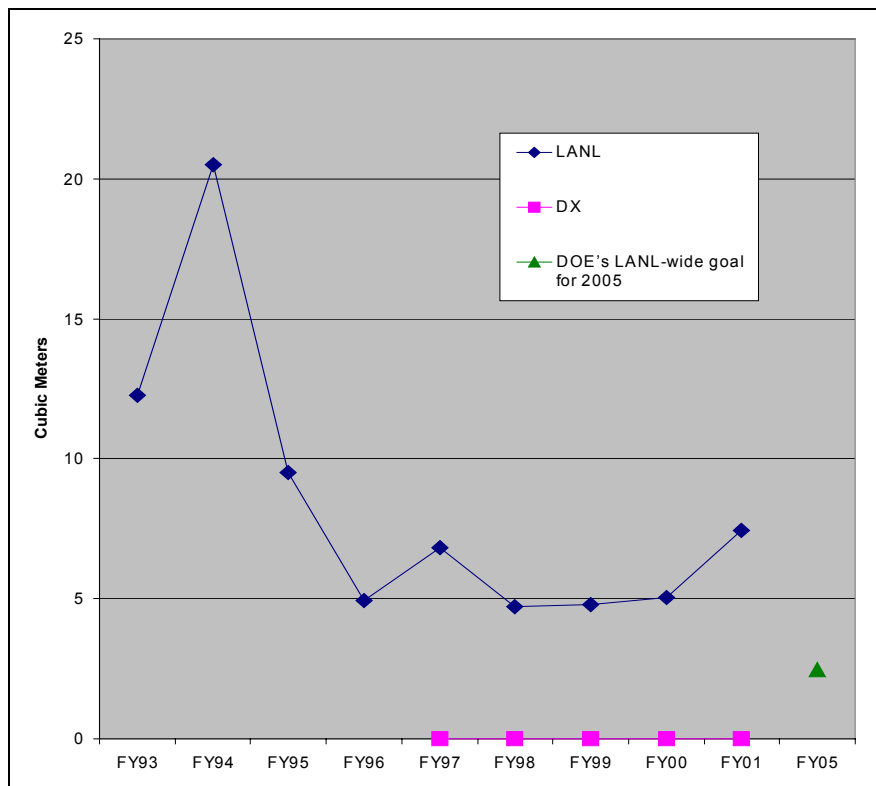


Figure 7-3. LANL and DX mixed low-level waste results.

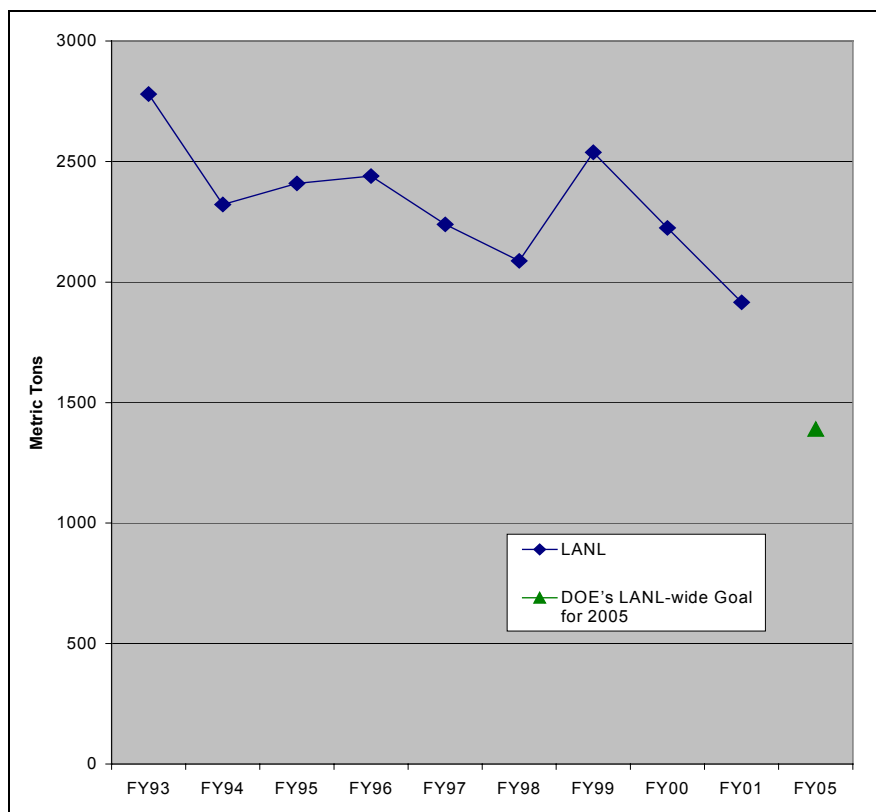


Figure 7-4. LANL solid sanitary waste generation results.

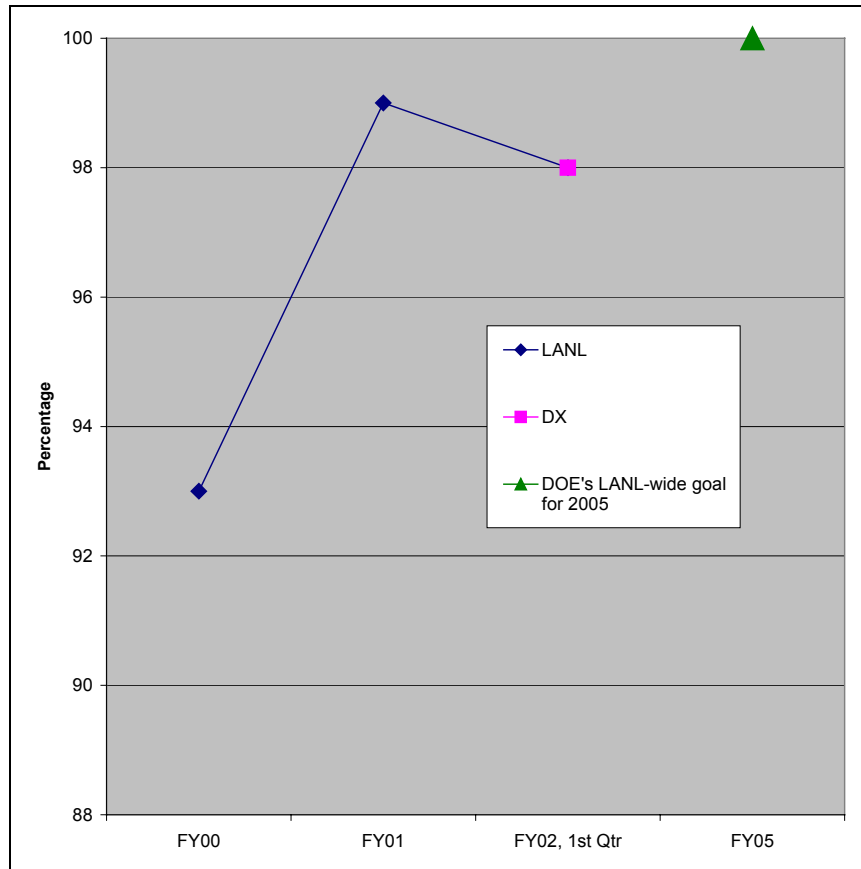


Figure 7-5. LANL and DX AP rates.

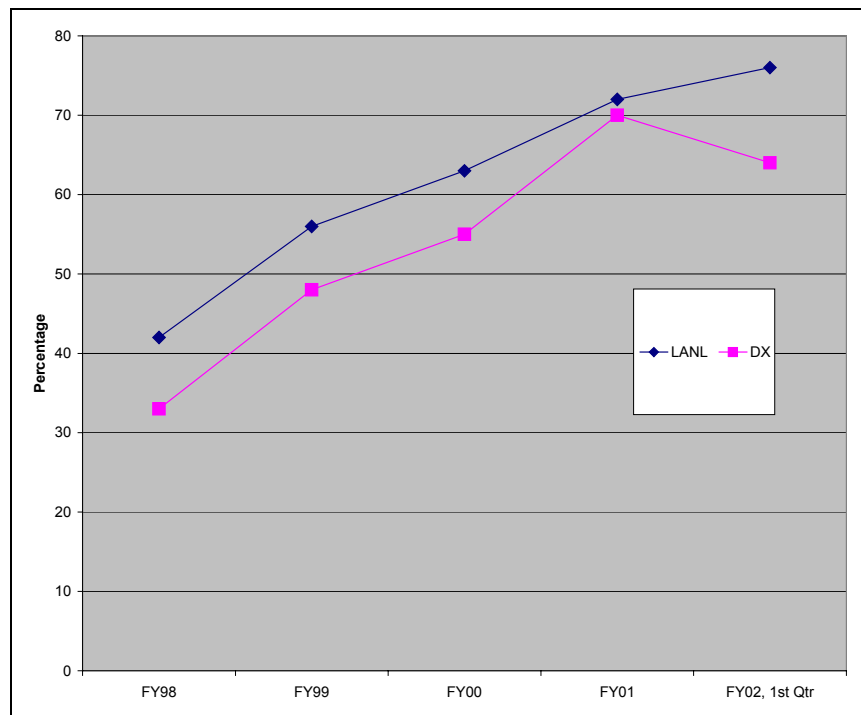


Figure 7-6. LANL and DX recycled purchase rates.

Management walkarounds are the most direct ISM mechanism for acquiring feedback on Laboratory operations at the day-to-day activity level. In Table 7-3, we present LANL and DX management walkaround results for all safety function tickets generated in FY01 and for environmental protection tickets generated during the same period. DX exceeded the overall LANL score for percentage of required walkarounds completed by 6 points.

Table 7-3. LANL and DX ISM Management Walkaround Results

	All FY01 Safety Function Tickets		FY01 Environmental Protection Tickets	
	LANL	DX	LANL	DX
Number of Required Walkarounds Completed	8638	336	161	18
Percentage of Required Walkarounds Completed	90	96	N/A	N/A
Deficiencies Tracked/Resolved	835	27	13	3
Noteworthy Practices Shared	894	19	20	2

7.2 CUSTOMER, SUPPLIER, EMPLOYEE, AND OTHERS RESULTS

As stated above, our main customer is DOE, and the best measure of customer satisfaction with our performance is the Appendix F process.

Appendix F provision 8-1.3.a, Measuring Supplier Performance, has significant implications in the area of Laboratory-vendor relations. This POCM gages the extent to which DOE is satisfied with BUS Division's ability to manage suppliers such that the goods and services provided meet LANL requirements, including requirements with an environmental impact. It is comparable to LLNL 8-1.3, Supplier Performance, and to LBNL 7-1.3, Supplier Performance. See Table 7-4.

DOE's rating of the success of LANL's AP policy—which has important implications for vendor relations—is incorporated into the institutional score on Appendix F provision 2-1.2.c.1, as reported above in Item 7.1. The AP rates for both LANL overall and for DX have also been reported in Item 7.1.

Appendix F provision 8-4.1.a, Meeting Socioeconomic Commitments, is one gage of the Laboratory's performance as a corporate citizen. This POCM registers the percentage of subcontract dollars in the following five categories: Small Business, Small Disadvantaged Business, Veteran-owned Small Business, Women-owned Small Business, and Historically Underutilized Business Zone Awards. It is comparable to LLNL 8-4.1.a, Meeting Socioeconomic Commitments, and to LBNL 7-4.1.a, Meeting Socioeconomic Commitments. See Table 7-5.

Table 7-4. Appendix F Supplier Performance Scores for Three Institutions

	LANL	LLNL	LBNL
FY99	95	95	82
FY00	95	98	82
FY01	95	95	75

Table 7-5. Appendix F Socioeconomic Commitments Scores for Three Institutions

	LANL	LLNL	LBNL
FY99	95	95	85
FY00	92	98	95
FY01	Not scored. Rating: "met."	Not scored	Not scored

The Checkpoint Survey, conducted annually by HR Division (except for 2000, because of the Cerro Grande fire emergency) is one of DX's most useful mechanisms for acquiring feedback from our employees. Survey results are expressed as percentage agreement with a series of statements describing key characteristics of excellence in worker satisfaction. Table 7-6 shows selected LANL and DX Checkpoint Survey results for the three most recent years. DX ratings are comparable to or exceed those of those of LANL overall, except in training. DX management will reassess the 2002 results to determine if a trend emerges.

Table 7-6. Selected LANL and DX Checkpoint Survey Results (% agreement)

Job Satisfaction Component	1998		1999		2001	
	LANL	DX	LANL	DX	LANL	DX
LANL provides adequate training to assist me with my career development.	not surveyed	not surveyed	not surveyed	not surveyed	52	47
My division management seeks my opinion on important issues impacting my job.	25	31	24	24	26	25
I am satisfied with my involvement in decisions that affect my work.	not surveyed	not surveyed	not surveyed	not surveyed	60	60
My group management recognizes the value of diverse perspectives and backgrounds.	68	73	70	69	66	73
My group management assures a safe work environment and use of safe work practices.	not surveyed	not surveyed	not surveyed	not surveyed	89	89

Another useful mechanism for acquiring feedback from the Laboratory workforce is the Upward Appraisal survey, conducted by HR Division. In this survey, workers rate managers on a five-point scale. Following, we present selected Upward Appraisal results for 1998 and 1999, the most recent years for which LANL-wide data are available. See Table 7-7.

Table 7-7. Selected LANL Upward Appraisal Results (disagree/agree on a 1-5 scale)

Manager Characteristic	1998	1999
Actively implements ES&H policies/procedures	4.42	4.49
Communicates openly and honestly with employees	4.01	4.14
Supports training and development for employees	4.27	4.33
Involves employees in planning and decision making	3.75	3.88
Expects employees to continuously improve	4.29	4.37

The two key indicators of worker health and safety are total recordable incidents (TRIs) and lost workday cases (LWCs). TRIs are all work-related deaths and illnesses and those work-related injuries that result in loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid. LWCs are the number of workdays beyond the day of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness. In Figure 7-7 and Figure 7-8, we compare LANL-wide TRI and LWC statistics with those of DX. Least-squares fits applied to the LANL data series indicates that the Laboratory as a whole will achieve the Director's goal for a LANL-wide 12-month average TRI rate of 1.0 and an LWC rate of 0.5 during the first quarter of FY02. DX will achieve the Director's TRI goal in the second quarter of FY02 and the Director's LWC goal in the first quarter of FY02.

Each year, the LANL Community Relations Division conducts a public survey to gauge how community leaders in northern New Mexico perceive the Laboratory. Figure 7-9 presents perceptions—on a five-point scale, unfavorable to favorable—for the years 1998-2001. Figure 7-10 shows results from the 2001 survey showing community leaders' evaluation of LANL's posture as a corporate citizen.

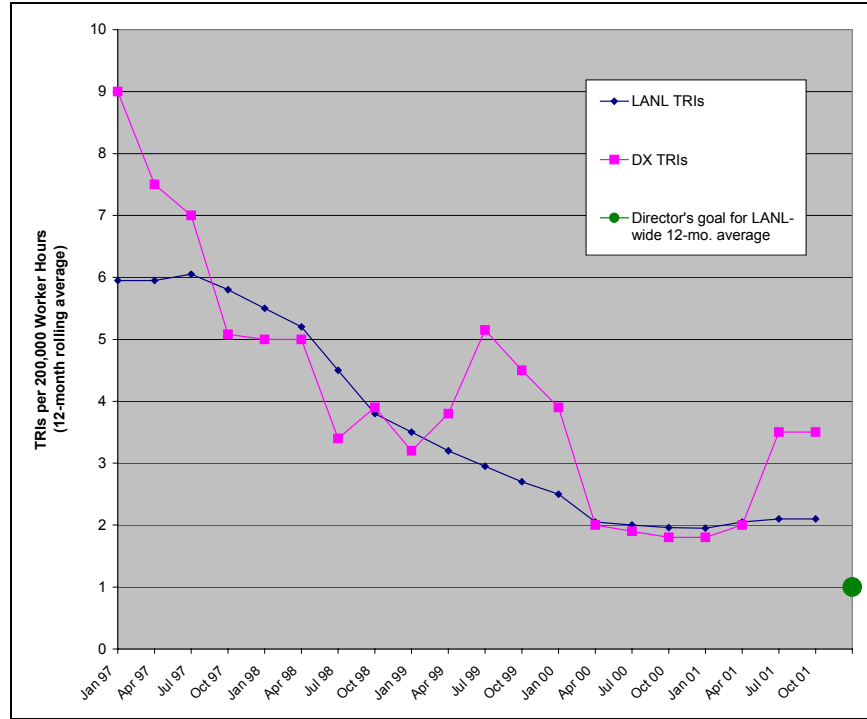


Figure 7-7. LANL and DX TRI rates.

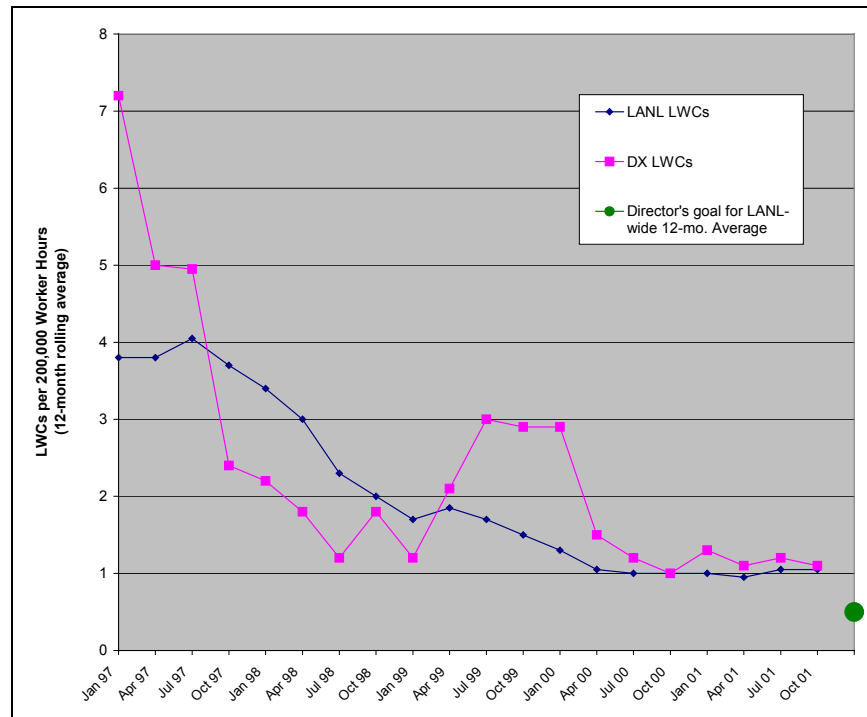


Figure 7-8. LANL and DX LWC rates.

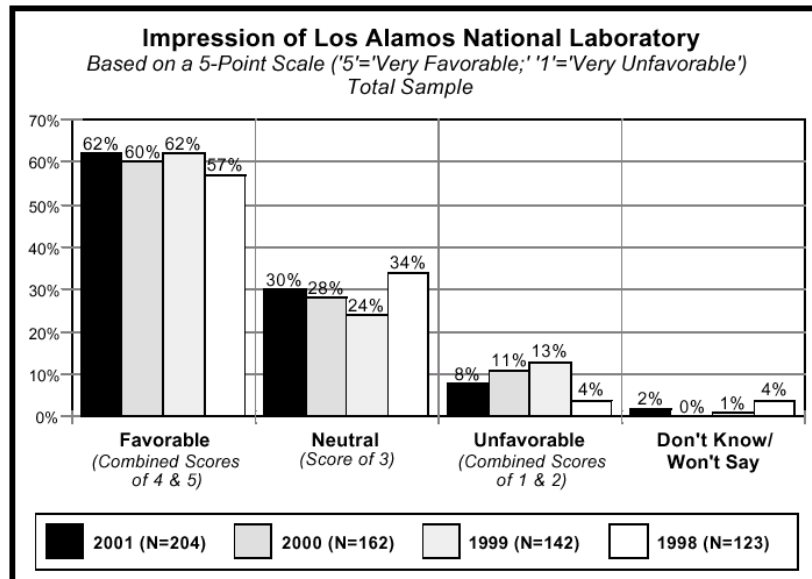


Figure 7-9. Community leaders' perceptions of LANL.

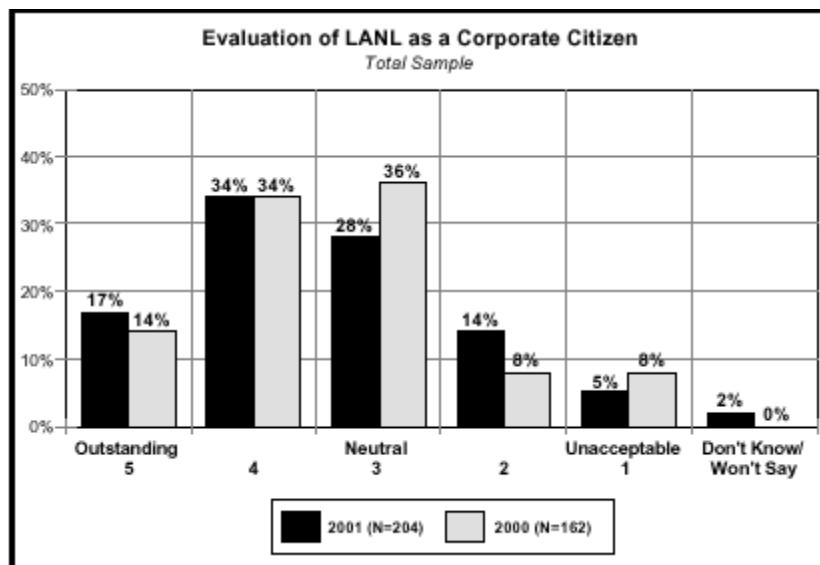


Figure 7-10. Community leaders' view of LANL's corporate-citizen posture.

7.3 FINANCIAL RESULTS

A measure of our main customer's satisfaction with the financial impact of Laboratory waste management practices is Appendix F provision 1-3.1.a, Tracking and Cost Savings. This POCM tracks and evaluates success in collecting waste chargeback information, implementing cost saving actions, and performing and implementing New Mexico Green Zia assessments. LANL's FY99 score was 85%; FY00, 78%; FY01, 82%. Appendix F of the LLNL and LBNL contracts contain a number of waste management provisions, but none correspond directly to the cost savings component of provision 1-3.1.a of the LANL contract.

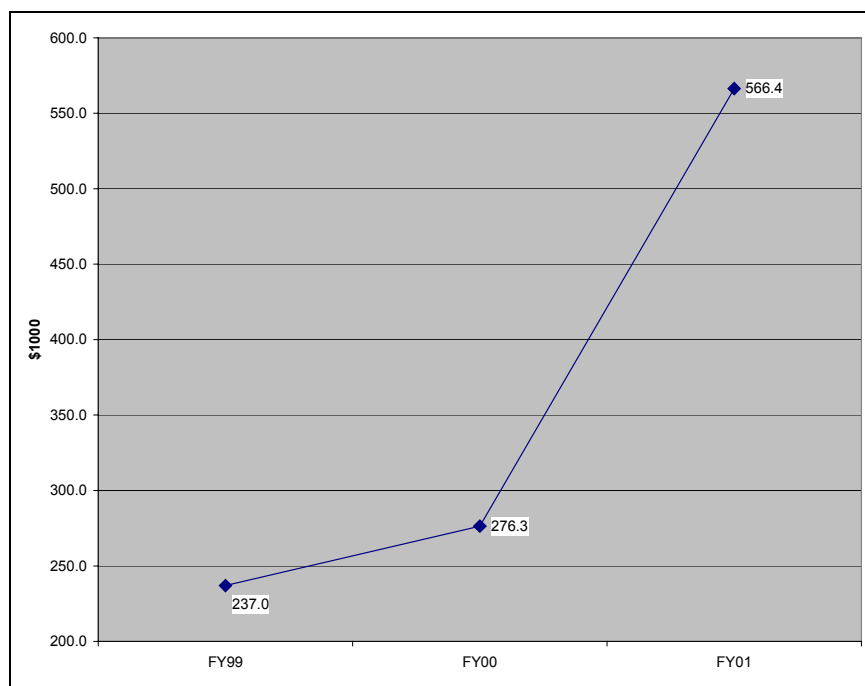
An example of the impact of LANL P2 policies on our bottom line is our solid sanitary waste recycling program. The recycling rate (called out in Appendix F, see Item 7.1) was 41% for all of FY01 and 75% for the first quarter of FY02. Table 7-8 shows the revenue streams LANL realizes from recycling vs. disposal of certain classes of sanitary waste—white paper, MS A1000 junk mail, cardboard, concrete and asphalt, brush, and soil. Cost savings from these six categories of waste accounted for \$566,400 in FY01, alone. See Figure 7-11.

Table 7-8. Quantities of Recycled Material from Six LANL Waste Streams, and Associated Cost Savings

Waste Stream	Disposal Costs (\$/MT)*	Recycle Costs (\$/MT)**	Year	Amount Recycled (MT)	Disposal Costs Avoided (\$1000)	Recycle Costs Incurred (\$1000)	Costs Avoided less Costs Incurred (\$1000)
White Paper	700	388	FY99	168	117.6	65.2	52.4
			FY00	167	116.9	64.8	52.1
			FY01	217	151.9	84.2	67.7
MS A1000	700	200	FY99	204	142.8	40.8	102.0
			FY00	213	149.1	42.6	106.5
			FY01	397	277.9	79.4	198.5
Cardboard	700	266	FY99	146	102.2	38.8	63.4
			FY00	215	150.5	57.2	93.3
			FY01	319	223.3	84.9	138.4
Concrete, Asphalt	95	26	FY01	730	69.4	19.0	50.4
Brush	95	17	FY99	250	23.8	4.3	19.5
			FY00	313	29.7	5.3	24.4
			FY01	100	9.5	1.7	7.8
Soil	95	5	FY01	1151	109.3	5.8	103.6

* based on prevailing rates as of this writing

** includes direct expenses for collection and processing by LANL and haulage fees charged by consignee

**Figure 7-11. Total LANL revenues accruing from recycling vs. disposal of six waste streams.**

As stated in Item 7.1, LANL will begin collecting division-specific solid sanitary waste recycling data during the current fiscal year. In next year's Green Zia application, we expect to present a comprehensive analysis of the financial impact of DX's recycling program.

We have tracked savings and/or return on investment associated with two components of the Wastewater Source Reduction Initiative. Before implementing the Chemlab Rinsewater Reduction project, DX-2 spent \$48,000 on analyses per year. Analytic costs now run \$12,000 per year. The dividends accruing from this project are annual savings of \$36,000—a return on investment of 85%. Before implementing the Wastewater Ozone Treatment project, DX-2 had two options for disposing of wastewater contaminated with organic solvents—sorption onto carbon beds or by heat treatment. Both routes were expensive, not only

because of treatment costs but also because of analytic costs. The return on investment accruing from the new path forward, involving ozonolysis, is 158%.

DX-3 reports that the Photo Film Substitution project, which replaces photographic film used in nuclear weapons mock-up explosives tests with phosphor-scan imaging, will this year post savings of over \$100,000 in chemical disposal and waste management costs.

As stated above, we expect to annually recycle about 4000 kg of spent ferric chloride, in connection with the Etchant Solution Recycle Project. PP data analysts use a standard disposal rate of \$11.75/kg when calculating disposal fees for hazardous wastes. Using the standard rate, disposal fees avoided amount to \$47,000 a year.

ACRONYMS

AA	Audits and Assessments Division	LANL	Los Alamos National Laboratory
AB	authorization basis	LBNL	Lawrence Berkeley National Laboratory
AP	affirmative procurement	LIR	Laboratory Implementation Requirement
BMP	best management practice	LLNL	Lawrence Livermore National Laboratory
BUS	Business Operations Division	LPR	Laboratory Performance Requirement
CAB	Citizens Advisory Board	LWC	lost workday case
CQI	continuous quality improvement	MAP	mitigation action plan
DARHT	Dual Axis Radiographic Hydrodynamic Test Facility	NEPA	National Environmental Policy Act
DOE	Department of Energy	NMED	New Mexico Environment Department
DX	Dynamic Experimentation Division	NRC	Nuclear Regulatory Commission
E	Environmental Science and Waste Technology Division	OB/OD	Open Burn/Open Detonation
EIS	environmental impact statement	OSHA	Occupational Safety and Health Administration
EPA	Environmental Protection Agency	PA-PI	Performance Assurance Performance Indicator Group
ESA	Engineering Sciences and Applications Division	PHERMEX	Pulsed High-Energy Radiographic Machine Emitting X-rays
ESH-ID	Environment, Safety, and Health Identification	POCM	performance objectives, criteria, and measures
ES&H	environmental, safety, and health	PP	Prevention Program
E2	energy efficiency	P2	pollution prevention
F&IB	Feedback & Improvement Board	RCRA	Resource Conservation and Recovery Act
FSP	facility safety plan	RRES	Risk Reduction and Environmental Stewardship
FWC	facility work control	ROD	record of decision
FWO	Facility & Waste Operations Division	SBO	Small Business Office
GSAF	Generator Set-aside Fee	SCP	Safety Concern Program
HCP	hazard control plan	SWEIS	Site-wide Environmental Impact Statement
HE	high explosive(s)	SWP	safe work practice
HR	Human Resources Division	SWPP	Stormwater Pollution Prevention
HSWA	Hazardous & Solid Waste Amendment	SWPPP	Stormwater Pollution Prevention Plan
IRMP	Integrated Resource Management Plan	TA	technical area
ISM	Integrated Safety Management	TRI	total recordable incidents
JCNNM	Johnson Controls of Northern New Mexico	UC	University of California
JIT	just-in-time		